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July
1933

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SEPTEMBER 25-29, 1933

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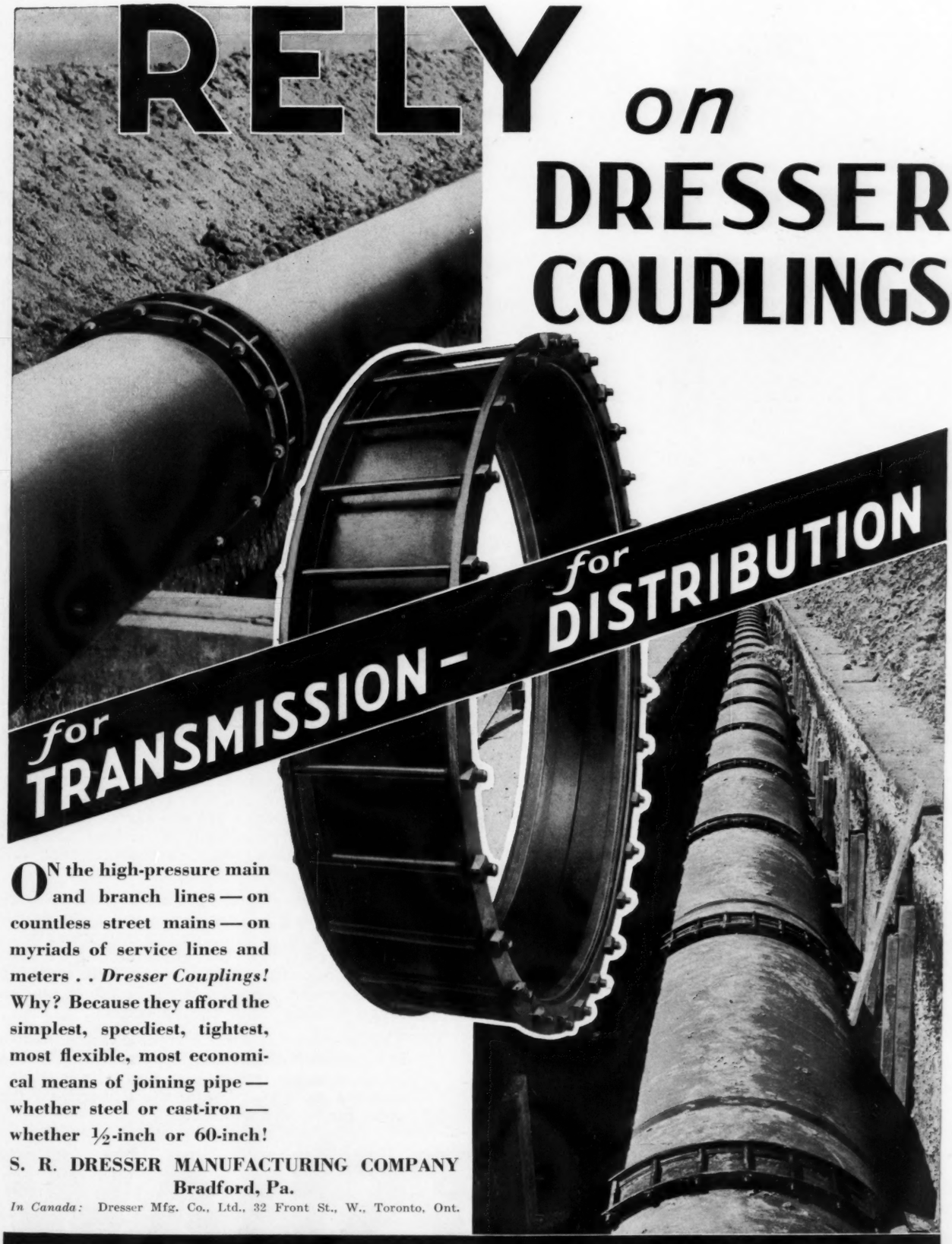

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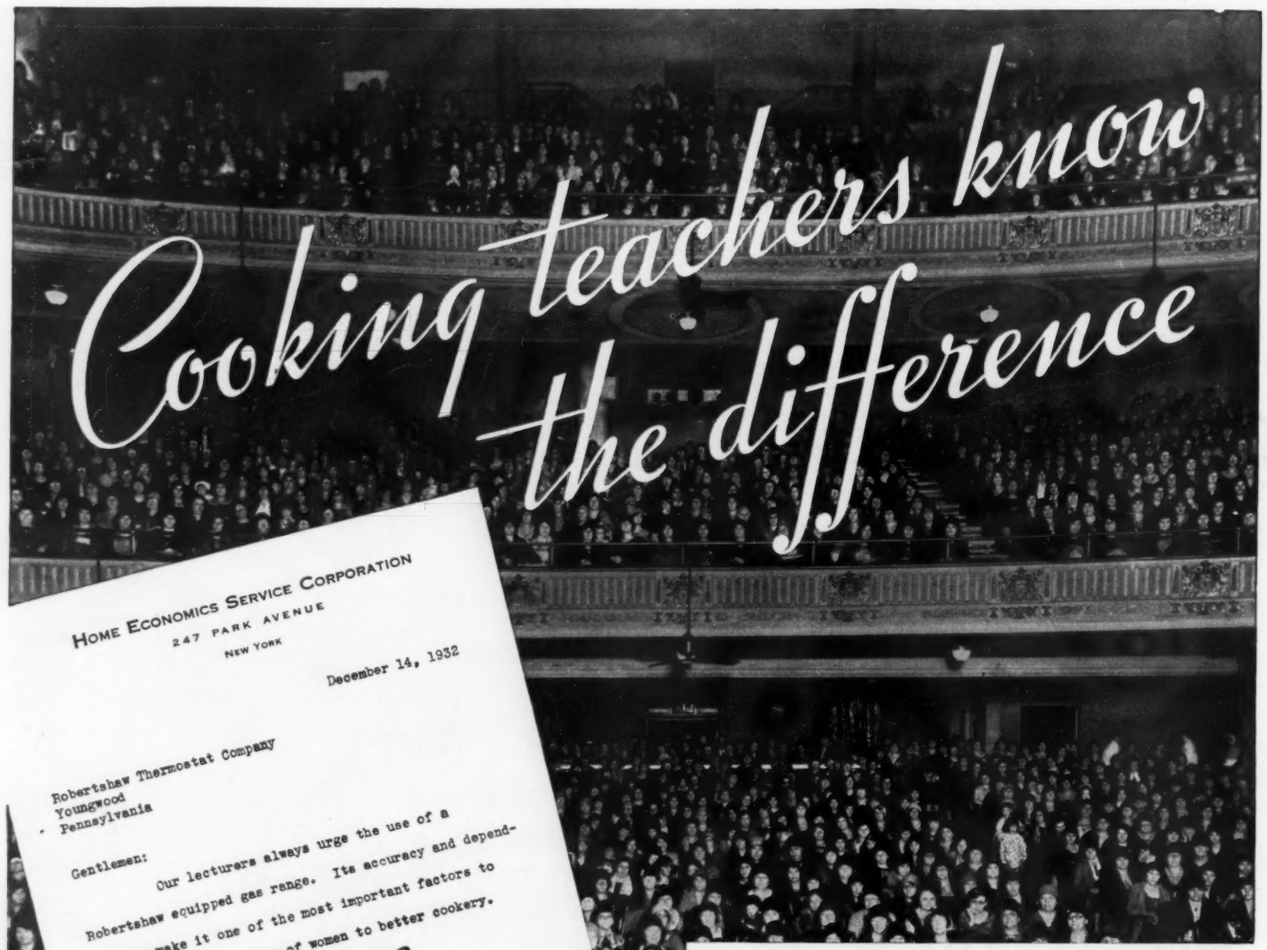

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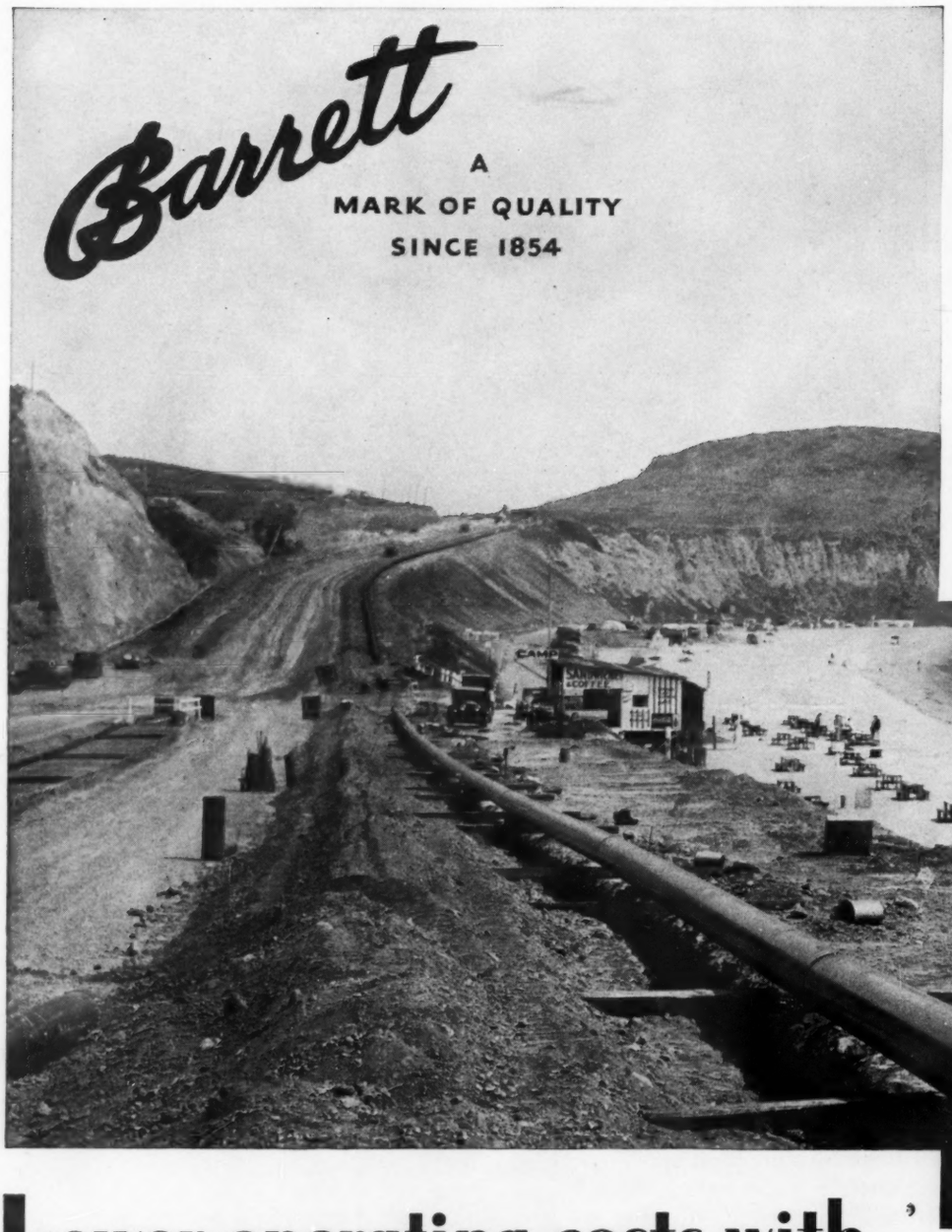

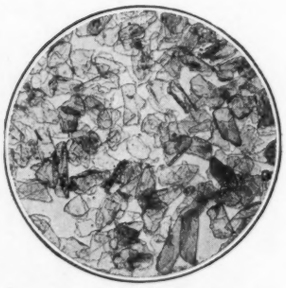

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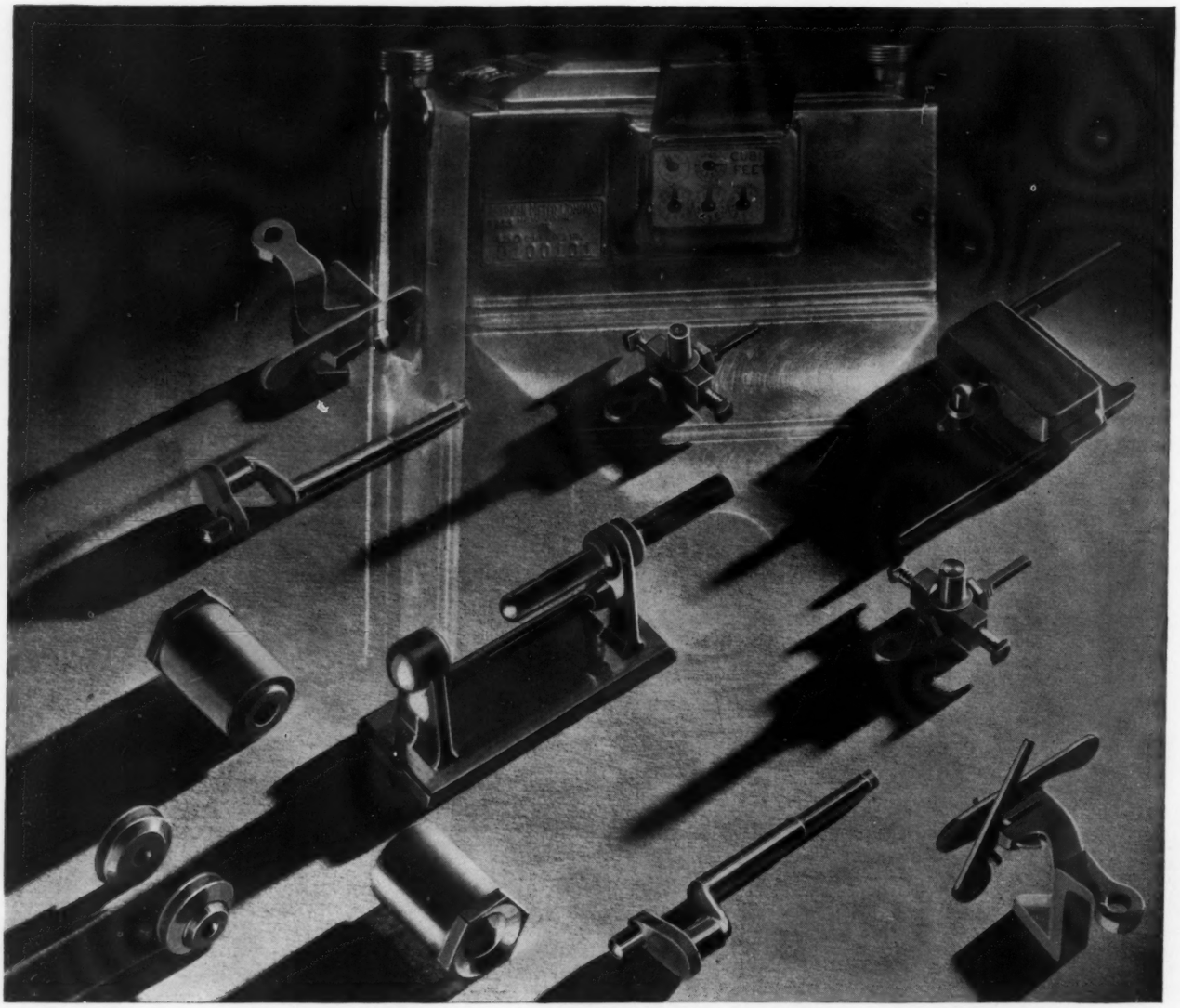

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WESTERN GAS

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Vol. IX, No. 7

A Monthly Journal of the Gas and Gas Appliance Industries in *Western America*

Manufacturers Organizing Under Industrial Recovery Act

By GEORGE H. FINLEY

Editor, Western Gas

FOR several weeks industry has been thinking feverishly in terms of co-operation, codes of fair competition, improved wage scales, limitation of production. Whether the National Industrial Recovery Act signed by President Roosevelt on June 16 be regarded as a fundamental change in American economics, or whether it be accepted as a temporary means of industrial self-discipline, the situation stands that many industries are already well advanced in their work of organizing under the Act. Among these are several gas appliance manufacturer groups which have adopted preliminary codes of fair competition.

Under the Act suitable penalties are provided for violation of such codes, and on his own motion the president may establish codes for industries which are laggard about putting their own houses in order. There are plenty of teeth in the measure through the licensing clause, under which those without licenses in any industry where the license system is invoked, are arbitrarily prevented from doing business.

As worded, the Act holds good "with respect to transactions in or affecting interstate commerce"; the "or affecting" phrase is interpreted by many to provide immediate sanction for intra-state codes, as well as codes governing interstate operations. However, companion bills are contemplated for state enactment; the California legislature votes on such a bill this month.

Need for agreement among gas appliance manufacturers along the lines permitted by this legislation has been evident for many months. With few or no exceptions the appliance men have gone without profits the past three years—a condition which reacts on the whole industry.

While the need for prompt organization is apparent, it is no time to be stampeded into ill-considered action. Agreement upon specific trade practices within each of the appliance divisions is one of the necessary first steps. Substantial opinion in the industry also holds it important to unite the entire gas appliance group on a basic code—to preserve the identity of the industry as against other fuels. Wherever possible it is held to be desirable to bring major industrial divisions before the president as a unit.

Steps in Organization

Thus far the organization work among the gas appliance and equipment manufacturers may be summarized as follows:

Meeting under American Gas Association Manufacturers' Section auspices, gas range manufacturers have organized the Gas Range Institute, drawn up a constitution, and sent out questionnaires seeking necessary information on costs and sales prices.

Space heater manufacturers have appointed a special committee to proceed with plans for a code.

Water heater manufacturers met on June 30 in New York, approved the outline of a code of fair competition, named a governing committee, and set July 18 for a general meeting in Cincinnati.

Earlier in the month a series of meetings on the Pacific Coast, called through the Pacific Coast Gas Association's Manufacturers' Section, brought the adoption of a fair competition agreement by the section's Water Heater Division.

The A. G. A. will call a meeting of gas apparatus manufacturers and contractors at an early date, at which code plans will be discussed for that branch of the industry.

All of the appliance groups, in addition to working out their separate codes, have before them the question of combining with other gas appliance divisions under a basic code.

Gas Range Institute

Since the range manufacturers are farthest advanced, on a national basis, a brief review of the Gas Range Institute set-up is of interest.

At a meeting of gas range manufacturers held in Chicago on June 1, decision was reached to organize the Gas Range Institute. A committee to proceed with preliminary organization was formed, which selected Mabon Roper of the Geo. D. Roper Corp. as chairman. The committee organized the Institute, which was formally launched on June 22 through adoption of Constitution and by-laws. Membership already represents 80 per cent of gas range production, and all manufacturers have been issued invitations to join.

A governing committee has been set up, consisting of D. F. Kahn, Mabon Roper, Paul Tappan (members for 3 years); Stanley Grady, R. B. Hurt, R. M. Leach, Walter Nagle (2 years); C. R. Graham, F. J. Hoenigmann, C. E.

(Continued on Page 46)

Utility Selling Vindicated *by* *Anti-Merchandising Law*

By C. D. GREASON

A DECISION which will no doubt have a decided effect on future attempts to pass legislation to prohibit utilities from merchandising in this country, was handed down Saturday, June 10, by the Kansas Supreme Court when it ruled the Kansas anti-merchandising law unconstitutional. It was one of the most important victories decided by a court in favor of utilities in a number of years.

The court ruled the law was *"unconstitutional and void because it is in violation of the 14th Amendment of the Constitution of the United States in that it denies to certain individuals, firms and corporations the equal protection of the law."*

Kansas was one of the two states to pass legislation denying utilities the right to sell appliances, although bills designed for this purpose have been introduced in numerous state legislatures in the past three years and in many cases were defeated only after hard, and in some cases, bitter fights. The other state to pass legislation of this nature was Oklahoma where no attempt has been made to test the constitutionality of the law.

All of the credit for testing the validity of the Kansas law in the courts goes to the Gas Service Co., a Cities Service company. This Doherty organization was carrying on extensive merchandising operations in its natural gas distributing properties in Kansas when the anti-merchandising law was passed by the 1931 session of the legislature. Ben C. Adams, veteran Doherty executive, vice-president and general manager of the Gas Service Co., and Judge Robert D. Garver, chief counsel, along with executives of the Cities Service Co. in New York, believed the law was discriminatory and unconstitutional. In spite of the fact that every other utility operating in Kansas was merchandising when the law went into effect, none of the others showed any inclination to test its validity or to join in a suit. It was decided that this Doherty organization would go ahead, unaided, and test the law in the courts.

The law became effective March 13, 1931, and prohibited sales after August 1, of the same year. August 3, 1931, suits were filed, in the Shawnee County District Court, at Topeka, the county where the state capital is located. Seperate cases were filed for each Gas Service Co. subsidiary property that was selling appliances, there being 10 in all, although some of these companies operate in a number of towns in the state.

An eleventh case involved habeas corpus proceedings filed by Louis L. Roesle, new business manager of the Capital Gas & Electric Co. at Topeka, who was arrested and convicted of selling a gas-burning appliance in violation of the statute.

The 10 original cases filed with the Shawnee District Court were consolidated in one suit under the Declaratory Judgment Act seeking a declaration that the merchandising law was unconstitutional. A temporary restraining order was granted by the court giving the 10 companies authority to sell appliances. Later a temporary injunction was granted which prohibited the state from interfering with the company's merchandising activities.

Judge Otis E. Hungate of the Shawnee District Court on November 4, 1931, held that the law was valid. The decision was then appealed to the state supreme court and the companies continued to sell under an injunction. Following the supreme court decision the suits were remanded to the district court with directions for the issuance of permanent injunctions.

Utilities and appliance manufacturers throughout the country have been awaiting with much interest the Kansas decision. It was also good news to the employees in the Gas Service Co. properties, particularly new business salesmen and service men whose jobs would have been jeopardized had the supreme court found the law valid. Had the supreme court declared the law constitutional it would not have had as serious effect on employees of other utility companies in the state. The Doherty organization had continued to sell throughout the period of litigation while the salesmen and some employees of the other companies were thrown out of employment when the Kansas act went into effect.

An attempt to have the anti-merchandising law wiped off the statute books was almost successful during the last session of the Kansas Legislature which met early this year. Repeal bills lacked only a few votes of passing, showing a decided change in sentiment in two years from the time the bill was originally passed.

Newspapers in Kansas had carried on a continuous fight to have the law abolished from the time it was enacted. Edi-

B. C. Adams

Judge R. D. Garver

FOLLOWING the passage of the anti-merchandising law in Kansas in 1931 these two utilities executives decided to test the constitutionality of the act by appealing to the courts. After the law was held valid in the district court an appeal to the supreme court of Kansas was successful in having the act declared unconstitutional. These men are officials of the Gas Service Co., a Cities Service company, with headquarters in Kansas City, Mo. The company operates in four states: Kansas, Missouri, Oklahoma and Nebraska, with the largest number of properties in Kansas.

B. C. Adams has for years been one of the outstanding general managers in the Doherty organization. He has managed Doherty properties at Lincoln, Neb.; Spokane, Wash.; Montgomery, Ala.; Joplin, Mo.; Toledo, Ohio, and St. Joseph, Mo. He has been vice-president and general manager of the Gas Service Co. since 1925.

Judge Robert D. Garver, chief counsel of the Gas Service Co., is the attorney who directed all of the proceedings for the company in the anti-merchandising case. Before joining the Doherty organization he practiced law at Topica, Kans., was later elected county attorney of Shawnee county and served as judge of the district court in that county from 1918 to 1919. He resigned to become general attorney of the Empire Gas and Fuel Co. in Texas and later served as attorney for the gas division of The Empire Companies at Bartlesville, Okla. He came to Kansas City in 1925 as chief counsel of the Gas Service Co., and is rapidly becoming known as one of the leading corporation attorneys in the Middle-West.

Kansas Supreme Court Ruling

Is Held Unconstitutional

The Gas Service Company

tors throughout the state were lined up almost solidly against the act and many columns of news stories and editorials appeared condemning this legislation. The Kansas Press Association at a meeting in Wichita on January 17, 1932, passed a resolution, by almost a unanimous vote, urging the repeal of the law and denouncing the act, "on the grounds that it is depriving cities and towns of adequate service and contributing to empty storerooms and unemployment."

While utilities in many states have experienced attempts to legislate them out of the merchandising business, one of the hardest fights to have legislation of this nature passed, was in Missouri. In this state two attempts were made, the first before the 1931 legislature and the second in the 1933 session, both of them being unsuccessful.

Again, as in Kansas, the Missouri newspaper editors were strong in denouncing the attempts to pass anti-merchandising bills. Missouri editors told their readers about the experience Kansas was having with this legislation on the statute books, and particularly pointed out that the Kansas law had failed to accomplish one of its chief purposes, that of aiding the business of the hardware merchants.

Five of the Kansas supreme court judges declared the law unconstitutional, Justices W. W. Harvey and John L. Dawson dissenting from the court's majority opinion, although they did not present a separate opinion. The opinion was written by Justice William Easton Hutchinson.

The opinion held:

"Where a public utility corporation is authorized to do business in Kansas in the manufacture, purchase, supply and distribution of artificial and natural gas, the sale of gas appliances by it, under the facts and circumstances set out in this opinion, is intimately connected with and incidental to the sale and distribution of gas, and is an implied power of such company because it directly and proximately tends to accomplish the general purpose for which the company was incorporated."

Relative to the unconstitutionality of the law the supreme court decision said:

"That Chapter 238 of the Session Laws of 1931 is unconstitutional and void because it is in violation of the 14th Amendment of the Constitution of the United States in that it denies to certain individuals, firms and corporations the equal protection of the law."

The court held that the anti-merchandising act is not related to a questionable business, or something harmful to the best interests of the people, stating that:

"It concerns the sale and distribution of articles which everyone would probably wish to possess. They are all useful and necessary to the equipment and furnishing of a modern home. The evidence showed these articles were being sold and distributed at a fair and reasonable retail price, and were installed without expense to the purchaser, and the use of any that were complicated was made pain to the purchaser; also old appliances were taken back in exchange at substantial prices. In none of these features can we discern anything detrimental to the welfare of the public."

The court held that:

"The act is not a fair or reasonable attempt to regulate public utilities, as that could readily have been done through the Public Service Commission, now the State Corporation Commission."

The court further held:

"A monopoly is defined as the exclusive right, privilege or power of selling or purchasing a given commodity or a service in a given market. These plaintiffs have no exclusive right or privilege concerning the sale of these appliances. Any merchant or individual can sell them. The effect of the law is to create a monopoly rather than prevent one. The obvious result of the enactment, if upheld and enforced, would be to limit the sale of such appliances to merchants and others, whose present prices according to the testimony are as high as those of the plaintiff corporations."

In conclusion, the court in its prevailing opinion said:

"With no feature of public welfare actually involved, the conclusion surely must follow that to deprive these plaintiffs of an implied power and privilege incident to their general business, is unreasonable, arbitrary, unjust and oppressive. Other individuals, firms and corporations can engage in merchandising these appliances, but this particular class cannot. They are deprived the equal protection of the law. We therefore conclude that the Act is unconstitutional as being in violation of the 14th Amendment of the Constitution of the United States."

The 10 Gas Service subsidiary companies which sought to enjoin Roland Boynton, attorney general, from enforcing the provisions of the law were: The Capital Gas & Electric Co., The Wyandotte County Gas Co., The Girard Gas Co., The Newton Gas Co., The Arkansas Valley Gas Co, The Hutchinson Gas Co., The Wichita Gas Co., The Pittsburg Gas Co., The Union Public Service Co. and The Western Distributing Co.

(Continued on Page 41)

NOT only in Kansas was the anti-merchandising decision welcome. To utilities at many points in the country where the merchandising issue has been agitated this clear statement from the Supreme Court of Kansas brings encouragement and reassurance. How the decision was received in Missouri—a neighboring state which defeated an anti-merchandising bill in its last legislature—is seen in this statement from Fred Karr, president of the Missouri Association of Public Utilities and president of the St. Joseph Gas Co.:

"The opinion of the Supreme Court of Kansas is certainly one of the most worthy contributions from a judiciary, and we hope it may prevent organized minorities from passing legislation against the interests of the general public and against the rights of individuals and corporations. The opinion is so clearly stated and so comprehensive that it deserves to be frequently quoted. Accordingly I wish to quote the following:

"'It appears to be strictly class legislation without any reasonable relation to the welfare of the public . . . With no feature of public welfare involved, the conclusion surely must follow that to deprive these plaintiffs of an implied power and privilege incidental to their general business, is unreasonable, arbitrary, unjust and oppressive. Other individuals, firms and corporations can engage in merchandising these appliances, but this particular class cannot. They are deprived the equal protection of the law. We therefore conclude that the Act is unconstitutional as being in violation of the 14th Amendment of the Constitution of the United States.'

"We believe this decision will be very far reaching in its benefits to the public and to the utilities, and in its effect on general business. We feel that the highest interests of the public, of the manufacturers of gas and electrical equipment and of the dealers in this equipment can be best promoted by permitting the utilities to merchandise and it is our opinion that utilities will now return to the merchandising activity unharassed by the fears of being thrown out of business, and encouraged and stimulated to promote tae sale of appliances through the dealers, as well as the utilities, in order that the public may enjoy the greatest uses of gas and electricity under ever more reasonable rates for their convenience and happiness."

FRED KARR
President, Missouri Association
of Public Utilities

Plans *and* Objectives *of the* National Directing Committee *of* Executives

By F. S. WADE

President and General Manager
Southern Counties Gas Company

MR. WADE'S report, presented to the Pacific Coast Gas Association's Northwest Conference held June 22-23 at Seattle, reviews the National Directing Committee's program which aims to center the gas industry's forces on a general sales development plan, particularly in the cooking, water heating and refrigeration fields. Incorporated in the report are the findings of a national survey to determine the sales and advertising needs of the industry. This study was conducted by N. W. Ayer & Son, Inc., and was presented to the A. G. A. Executive Conference in Chicago on June 2 by W. A. Gilman, vice-president of the Ayer organization.

F. S. Wade

Mr. Wade's paper was read to the Seattle conference by A. E. Higgins, secretary of the A. G. A. Natural Gas Department.

THE National Directing Committee of Executives was created through a resolution adopted by the Spring Conference and approved by the Executive Board of the American Gas Association in June, 1932. The committee was assigned the duty of preparing a sales development plan for the gas industry and instructed to use every influence to see that the plans finally adopted should be put into operation in every gas company throughout the United States.

The resolution creating the National Directing Committee called for a sales development plan covering the use of gas for cooking and water heating but did not mention refrigeration. With the recent advent of perfected air-cooled gas refrigerators, the committee felt that this use of gas should be included in its program and was given the authority by the Executive Board to thus enlarge the scope of its activities.

With the foregoing purposes in mind, the personnel of the committee which was completed during the summer of 1932 was selected to include leading executives from each important branch of the business: natural and manufactured gas; the appliance manufacturing group, so that all divisions of the industry would be adequately represented, both regionally and otherwise.

The first meeting of the committee was held during the annual convention of the American Gas Association in October, 1932. A plan of procedure for the committee was developed at that time, and this plan was approved by the Executive Board in November, 1932. At that time the chairman of the committee directed attention to the broad scope of the program which the committee had undertaken. He stated that such a program should receive the attention of the best advertising and sales talent available, both within the industry and without. To this end, the committee sought the guidance and support of a special committee representing the sales and advertising personnel of the gas industry. As a result of their recommendations, the committee concluded that it would be necessary to obtain the services of a qualified advertising agency to study the sales and advertising needs of the industry and to formulate a detailed program.

The Executive Board authorized a sufficient appropriation to obtain the services of N. W. Ayer & Son to carry out this survey. On February 15, 1933, the Ayer agency placed a number of men in the field to collect all relevant information and data. The material so collected was forwarded to the agency's headquarters where it was compiled and studied. The high lights of the Ayer conclusions and recommendations will be given later in this report.

In the meantime, the National Directing Committee sought and received the assistance of the several sales and advertising committees within the Association to determine the objectives which should be incorporated in the committee's program. Participating in these activities were the Range and Water Heating Committee of the Commercial Section and the Rate Structure Committee.

One of the activities which the National Directing Committee undertook to promote was that of educating and training the sales and general employee personnel to stimulate the sale of gas and gas appliances. The committee actively sponsored the use of the course "Tell Them About Cooking-with-Gas" which had formerly been prepared by the domestic range committee of the Commercial Section. Very satisfactory results have been reported where this course has been used.

As a result of discussion with numerous leaders of the industry, the committee has given much consideration to the need for developing and perfecting the completely automatic gas range at an early date. Following several conferences on this subject, the committee has requested the appropriation of $5,000 for the American Gas Association laboratory to perform research work in this field.

The results of the survey made by N. W. Ayer and Son were presented in summary form to the National Directing Committee on May 15; thereupon the committee instructed Ayer to prepare a more detailed and amplified version of their findings for presentation to the Executive Conference held in Chicago on June 2.

I give below the report which was presented by W. A. Gilman, vice-president of the Ayer organization:

On February 15, 1933, N. W. Ayer & Son, Inc., was authorized by the National Directing Committee of Executives to make a survey of the sales and advertising problems of the gas industry.

(Continued on Page 38)

Murals symbolizing the two branches of the industry—manufactured and natural gas—together with models, showing the processes involved in the production, transmission and distribution of manufactured and natural gas, form an important focal point in Gas Industry Hall.

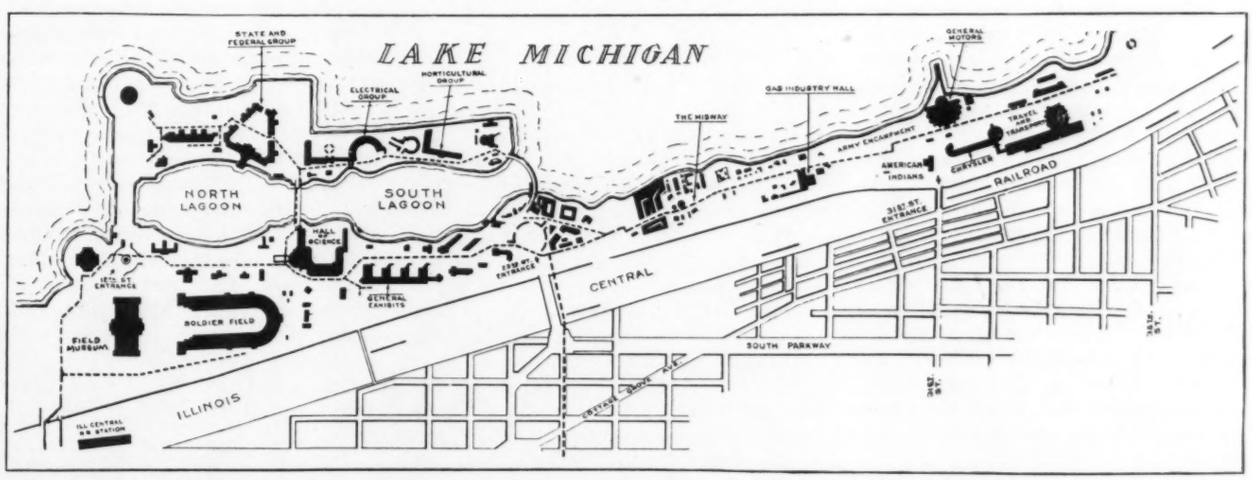
Gas Service During "A Century *of* Progress"

UNDER the newly made ground on which Chicago's Century of Progress Exposition raises its beautiful buildings, several miles of gas mains are in operation, contributing to the comfort of visitors and making possible an efficiency in operating the concessions at the Fair which otherwise would be impossible. In addition to supplying the Exposition with its fuel, the gas industry has contributed its share of beauty, with the Fountain of Flame and Gas Industry Hall outstanding among industrial show places in the grounds. Dedication of the Fountain of Flame by Arthur Hewitt, president of the American Gas Association on June 3, marked the official beginning of the industry's participation in the Fair.

Symbolizing the service rendered by gas through the medium of heat, the Fountain of Flame is a tall pilaster-like structure, about 12 feet high which glows with various luminous colors typical of the use of gas fuel in the various fields. Across the top of the structure is the word "Gas" silhouetted against a jet of luminous gas flame. At the top of a fluted column to the left appears the figures 1817 in block letters, designating the year in which the gas industry was born in this country. At the top of a similar column to the right are the figures 1933, symbolic of more than a century of service of gas in the United States.

Laying of gas mains into the Fair grounds necessitated tunneling under the Illinois Central tracks at the lake front, and drilling through a concrete breakwater. Gas is taken from a 30-inch

(Continued on Page 45)



Sketch of the gas distribution system laid for Chicago's 1933 Exposition. The dotted lines show more than 26,000 feet of main, varying in diameter from 3-inch to 12-inch, laid by gas company distribution department crews.

Rate For Space Heating Service

First Block (see opposite side)	@	$1.05 per 1000 cubic feet
Next 20,000 cubic feet	@	.60 " " "
Next 80,000 cubic feet	@	.50 " " "
All additional cubic feet	@	.46 " " "

Discount: 5% on $25.00; 1% on excess

Minimum monthly bill—First block of rate from November to April inclusive; during other six months $1.00 net.

Branch Offices

Wellston, 6304 Easton Ave. Luxemburg, 249 LeMay Ferry Road
Maplewood, 7179 Manchester Ave. University City, 6500 Delmar Blvd
Office hours: 8 a. m. to 5 p. m. Saturday to 1 p. m. only

In addition to the regular monthly billing, Degree Day data is carried for the period covered by the bill, as well as similar data for calendar months for six years past, as shown on the right. On the address side of the bill, which is printed on a government post card, are given the St. Louis County Gas Co.'s rates for house heating service.

THE ST. LOUIS COUNTY GAS CO.
WEBSTER GROVES, MO.

SPACE HEATING SERVICE

DEGREE DAYS by CALENDAR MONTHS

	Normal	1927 1928	1928 1929	1929 1930	1930 1931	1931 1932	1932 1933
October	192	142	178	210	300	144	254
November	588	509	573	708	529	322	720
December	933	1009	818	853	902	617	955
January	1051	939	1160	1247	843	781	885
February	848	795	1013	553	653	593	....
March	848	598	451	639	755	808	...
April	267	382	242	196	270	234	....
May	....	49	198	54	155	42	....
Total	4525	4421	4631	4458	4407	3541	....

The Degree Days shown in the above table are for calendar months and are not necessarily for actual billing periods.

DEGREE DAYS THIS PERIOD	914	
READING 2/28	7758	
READING 1/28	7346	
HUNDRED CUBIC FEET USED	412	
GROSS BILL	25.90	25.90
Discount if paid by MAR 13 '33	1.26	1.26
NET BILL	24.64	24.64
HEATING SERVICE		
HEATING SERVICE		
FORFEITED DISCOUNT		
TOTAL		

SEND COUPON WITH CHECK TO THE ST. LOUIS COUNTY GAS CO., WEBSTER GROVES, MO.

DISTRICT 13
No discount after MAR 13 '33
FIRST BLOCK 6,000 CUBIC FEET

Gas Gas Dis. SUNDRIES

W. R. WEIGHTMAN
13B — 222 E. PACIFIC
64
WEBSTER GROVES, MO.

The Gas Heating Customer . . . *and* His Gas Bill

Give the Customer the Facts *before* He Asks for Them

By W. L. JONES

Sales Manager
The St. Louis County Gas Company
Webster Groves, Missouri

"WHAT'S wrong with this picture?" The customer pounds loudly on the table and between pounds expostulates: "Here I sign up with the Toonerville Gas Co. to heat my home with gas on the basis of it costing $125 for a whole season and I get a bill for $30 for one month." The clerk produces some long tables of figures headed, "Degree Days — January" but the customer, seeing that he is going to be asked to understand something that he does not want to understand—at least at this time — goes on, "Figures, figures, figures. I got figures in my business too and they are all red ones. I don't care anything about figures. Who's going to pay the bills?"

What's wrong? Simply stated, the customer has not been brought to realize that a part of this bill is for cooking and water heating and that the weather during this month was such that one-fourth of the fuel for the entire winter was required. In this case the customer is unduly alarmed as the January bill is not out of line with the estimated seasonal cost. However, the clerk has produced his figures too late for them to be taken seriously by this customer, who looks on them as an alibi.

Would not it have been better for the company to have informed the customer in advance, or at least with the January bill, just how cold January was? For years, we in the gas industry have talked about how wonderful it would be if we could list on the gas bill the services that the gas has performed rather than merely the cubic feet of gas used. Gas heating bills offer just such an opportunity, for with this service the personal factor varies but little from month to month, and the weather gives a practical index to heating needs and, therefore, to fuel requirements.

Customers of The St. Louis County Gas Co. receive monthly with their gas heating bills statements of the "Degree Day Deficiency" during the periods covered by the bills. In this way customers have more than just a statement of how much they owe—they have a statement of the amount of heat that was needed during the month. There is nothing elaborate or sensational in the way it is stated on the bill, but it is accurate and in a surprisingly large number of cases the figure differs from the customer's impression of the heating requirements.

Prior to the adoption of this system of listing Degree Days on the bill, consideration was given to a plan of equalizing the bills during the winter months. However, from past experience it was shown that it was not the amount of the bill that caused the trouble, but the fact that customers did not understand the variation from month to month.

Regardless of the kind of fuel used to heat a home, the quantity required will be approximately proportional to the Degree Day Deficiency. This fact is frequently overlooked by those who heat with coal, coke or oil. Because these fuels are purchased in advance, stored and then used as needed, the amount used during any month is seldom accurately known. In January, 1930, St. Louisians burned one-fourth of their winter's fuel, but there were few who used stored fuels who were aware of this fact.

Prior to 1932 the company had two occasions to explain Degree Days to its customers. In St. Louis County, the

(Continued on Page 36)

Pacific Coast Gas Association

Managing Director: Clifford Johnstone
Association Headquarters:
447 Sutter Street, San Francisco

President: H. L. Masser
Vice-President and Executive Engineer,
Los Angeles Gas and Electric Corp.

Review of Program at the Northwest Conference

LOAD building, in the face of present competitive obstacles, was the subject given primary attention at the Pacific Coast Gas Association's Northwest Conference, held this year at Seattle, June 22-23. President H. L. Masser presided over the meeting, and program arrangements for the four sessions were in general charge of Jas. F. Pollard, general manager of Seattle Gas Co., assisted by J. Earl Jones and W. I. Battin.

Under the general head of "Aids to Load Building" the first morning's session of Thursday, June 22 brought discussion of inducement rates, appliance rental, free installations and free appliances, prepayment meters, and advertising. W. D. Dickey's discussion of prepayment meters appears in this issue, and others of the papers will be published in future issues.

Therm Rates: Presenting Seattle Gas Co.'s experience with therm rates and budgeted billing Mr. Pollard stated that some 8,000 out of 45,000 customers (18 per cent) have availed themselves of the option to be billed on a therm basis. The company is very well satisfied with the working of the plan and anticipates its continued use.

Free Installation: British Columbia Electric Power and Gas Co. has had in effect for some months an offer of free installation of ranges, and a free water heater installed at no cost for any customer. The offer, which closes July 15, was explained to the conference by J. Fremont, gas new business manager for B. C. Electric. To date some 1800 free tank heaters have been installed and about 40 per cent of these customers have bought ranges. Also, about 220 electric water heaters have been installed under the plan.

Appliance Rental: Rental of gas appliances was treated by C. B. Babcock, president of the C. B. Babcock Co., in an interesting paper which gave high lights of the English experience in this regard. The English practice of installing prepayment meters, with free installation of radiant heater, water heater, incinerator and gas range, is virtually a rental plan since the customer is given a short measure of gas to compensate for free installation and free appliance use. Advantages assigned to the plan were ease of collection, more general use of appliances, a competitive advantage for gas as against other fuels, and use of gas among consumers of limited income. Financial and revenue aspects of the plan were analyzed, and the experience of American gas companies with rental plans commented upon.

Advertising: J. Chas. Jordan, assistant advertising manager of Pacific Gas and Electric Co. and chairman of the P.C.G.A. Publicity and Advertising Section, brought the morning's session to a close with an excellent general discussion of utility advertising essentials.

Home Service: "Appliance Selling" was the general head for the Thursday afternoon program, the first discussion being by Beatrice Strege, home service director of the Seattle Gas Co. The Seattle company is staging several lunches each week for small women's clubs in an auditorium arranged in the basement of the Gasco building. Club members are charged 40 or 50 cents for the luncheon, of which only 10 cents goes to the company and the balance to the club treasury. After lunch the women listen to a demonstration of gas appliances and then conduct a program of their own. So popular have these lunches become that the auditorium is booked ahead solidly until next February, with no organizations repeating. Costs to the company average only $10 weekly. The auditorium holds 50 comfortably, and from 5,000 to 6,000 women will be reached by the activity.

Collections, Repossessions: Norbert O. Fratt, credit manager of the Seattle Gas Co., told of his company's program for lowering bad collections and repossessions on merchandise. Little difficulty is encountered on commercial and industrial sales since substantial down payments and shorter terms are the rule in that field. Apartment house sales are another story, with a high rate of turnover in owners, and consequent difficulty in keeping equipment sold. For meeting the high loss in domestic meters encountered in the past two years the company at the suggestion of J. Earl Jones, commercial manager, has instituted a "Customer Saving Division" which investigates why customers are giving up their equipment, even before repossessions are effected. Considerable reselling is possible in this way. Salesmen are tied up closely to their original sales, commissions being charged back when sales do not stick, and compensation being given for collections. When the salesman fails to effect collection the account is turned to the Special Merchandise Collector, who is authorized to revise terms and in other ways make unusual effort to retain customers. Repossessions have dropped to almost nothing under this system. With $300 invested per customer the company deems it wise to make every possible effort to retain its customers.

Employee Selling: R. W. Coblentz, commercial manager of the Washington Gas and Electric Co. led a discussion on employee selling. Pointing out that the depletion of cash reserves has handicapped companies in hiring and training regular sales forces, he stated that this breach must be filled by the general employee, and that getting results through this channel is an educational problem. Departments heads and foremen must be sold on the idea, and material such as the A.G.A. course on "Tell Them About Cooking-with-Gas" must be available for water heating, refrigeration and house heating. Ideas on assignment of territory, compensation, special classes, etc. were developed by Mr. Coblentz.

Anti-Merchandising Trends: H. M. Thomas, general manager of the Northwest Cities Gas Co., in his paper, "Artificial Obstacles to Selling Imposed by Regulation," dealt with anti-merchandising legislation of the type applied in Kansas and Oklahoma, and special discriminatory regulations in Arizona, Oregon and Washington. He showed that from the time of their origin utility companies have been forced to develop uses for their services, and while they have always welcomed and aided the merchant

as a co-worker in appliance selling they have found few dealers interested in maintaining the year-to-year promotion necessary to build load. Mr. Thomas reviewed the Oregon Public Service Commissioner's rulings which call for larger companies to divorce their merchandising and regulated utility functions, and also covered the less drastic measure passed at the last Washington legislature. This law requires separate accounting of capital and revenues involved in merchandising, ruling that such capital shall not be a part of the fair value of the companies for rate making purposes, nor the revenues or losses be a part of operating revenues or losses of the companies as public service enterprises. Mr. Thomas went into basic causes for the present agitation against utility sales work, calling upon utilities to recognize the seriousness of the issue and challenge its progress in every way possible.

Production Committee: A Technical Section session presided over by C. P. Johnson, chairman of the Production Committee and superintendent of the Puget Sound Power & Light Co.'s gas department at Bellingham, was held Friday morning. The final report of the Production Committee was submitted, in separate sub-committee reports on the following subjects:

Chemical Laboratory Methods, J. M. North, Los Angeles Gas and Electric Corp., Chairman of Chemical committee.

Making Repairs to Water Seal Gas Storage Holders, T. N. Kellett, Los Angeles Gas and Electric Corp., chairman Holder Maintenance Committee.

Tar Disposal, W. H. Wattenberger, Washington Gas and Electric Co., chairman, By-Products Committee.

Operating Forum: A symposium on operating problems was also conducted, led by R. A. Hoffman, assistant superintendent of the Spokane Gas and Fuel Co. In this symposium F. C. Hawks of Washington Gas and Electric Co. described repairs made to a water-sealed holder while in service; W. R. Alexander of Seattle Gas Co. discussed the plant changes now under way for using 100 per cent heavy oil for carburetted water gas at Seattle; C. H. George of Puget Sound Power and Light Co. gave his company's experience in repairing the lining of water gas sets by spraying on coatings of refractory cement; Ray G. Penning of Spokane Gas and Fuel Co. contributed a number of "operating kinks," describing among other items the plant procedure followed in lowering coke production at Spokane.

Natural Gas Prospects: Harold E. Culver, supervisor of geology, State of Washington, brought to the conference a summary of "The Present Status of Natural Gas Development in Washington." While the only commercial development in the state is that of the Northwestern Natural Gas Corp., gas coming from shallow production in the Rattlesnake Hills, Benton County, in eastern Washington, a number of test developments are now under way. Deepening of one of the Benton County producing wells is in progress; gas is considered possible in the lower Wenatchee Valley; a test is being sunk at Union Gap, south of Yakima. Most of the geological work on natural gas has been done in the lowlands of western Washington, and several tests are in progress in that area at this time. Early test work in Washington was handicapped by lack of adequate geologic information, and well operations were often improperly handled. The conclusion seems justified that natural gas discoveries of importance are entirely possible in Washington.

House Heating: "Competition" was the theme around which the closing session of Friday afternoon centered. Ray Trowbridge, industrial engineer for Seattle Gas Co., introduced the discussion with comments on house heating load promotion. He discussed his company's budget plan for spreading heating costs, house heating rates, advertising, dealer cooperation, salesmen's contacts and sales promotion in general, for holding and building the heating load.

Domestic Competition was the discussion subject introduced by Jas. L. Stone, vice-president and general manager of the Spokane Gas and Fuel Co. Electric sales inroads and solid fuel competition in the Northwest came in for treatment, together with recommended sales tactics for conducting the gas offensive.

National Program: F. S. Wade, president of the Southern Counties Gas Co. and a member of the A.G.A. National Directing Committee of Executives, prepared an outline of the Committee's program, as published on another page of this issue. His paper was read by A. E. Higgins, secretary of the A.G.A. Natural Gas Department.

Collection Methods: R. N. Dreiman, general auditor of Coast Counties Gas and Electric Co., and chairman of the Accounting Section of the Association, presented a paper on "Collection Methods in Depression Times" in which he called for a recognition of credit fundamentals. Public relations actually suffer from indiscriminate extensions of credit. The public, with lowered income, will pay first those obligations which cannot be evaded, and must be educated to place the gas bill in this class. A well defined credit policy should be developed by every company, fully supported by management and by sales department. Mr. Dreiman described the credit procedure followed by his own company, which calls for:

A. Disconnect notices to be sent 15 days after presentation to all consumers who are not on the "good credit" list. B. Notices to good credit consumers when their bills show an unpaid balance for previous month's service. C. Disconnect notices to be followed up closely and enforced without discrimination. D. Exceptions to established rules to be approved by Executives. E. Every facility to be utilized to force payment from evaders and dishonest consumers.

An attendance of 100 benefited from the Seattle Conference, the program being one of the best yet held in the Northwest. The conference concluded with a banquet on Friday evening at which Worrall Wilson, chairman of the board of the Seattle Trust Co. and a director of the United States Chamber of Commerce, gave an address on self government of industry, discussing several phases of the National Industrial Recovery Act.

Southern Calif. Gas Co. to Begin Work on Connecting Line

Southern California Gas Co., Los Angeles, Calif., will start construction in the near future on 4½ miles of 16-inch gas transmission line to connect Standard Oil Co.'s newly located high pressure absorption plant in the Kettleman Middle Dome with Southern California's 20-inch line out of the field to the south.

1933 Calendar

July

Southern California Meter Association — Long Beach, Calif., July 27, 1933.

September

Pacific Coast Gas Association— Annual Convention, Ambassador Hotel, Los Angeles, Calif., Sept. 13-15, 1933.

Canadian Gas Association—Annual Convention, Ottawa, Can., Sept. 18-19, 1933.

American Gas Association—15th Annual Convention and International Gas Conference, Chicago, Ill., week of Sept. 25, 1933.

Natural Gas Department, A.G.A.— Annual meeting, Chicago, Ill., Sept. 25, 1933.

October

American Petroleum Institute—14th Annual Meeting, Chicago, Ill., Oct. 24-26, 1933.

COMMITTEE:
DOUGLAS BUCKLER . SO. CALIF. GAS CO.
J. EARL JONES . . . SEATTLE GAS CO.
J. CHARLES JORDAN (CHAIRMAN) P. G. & E.
F. U. NAYLOR . . . . . P. G. & E.
D. L. SCOTT . . . . L. A. G. & E. CO.

HEADQUARTERS:
PACIFIC COAST GAS ASSOCIATION
447 SUTTER STREET SAN FRANCISCO

H. L. MASSER (L. A. G. & E. CO.) PRESIDENT
CLIFFORD JOHNSTONE, MNG. DIRECTOR

CO-OPERATIVE ADVERTISING

JULY NEWS

SCHEDULE of Advertisements

Year after year, month after month, this coastwise trade-journal campaign "hammers away" with powerful sales messages especially prepared for 11 different classifications. Since its inception more than 200 advertisements have been prepared, **nearly all featuring actual installations and testimonials.** Creating new "prospects," keeping present gas users "sold" and encouraging gas appliance dealers are objectives of this sustained regional campaign. July insertions:

Appliance Dealers — Western Plumbing and Heating Journal and Western Appliance Retailing.

Architects, Builders — Architect and Engineer, California Arts and Architecture, Pacific Builder and Engineer, Southwest Contractor and Builder.

Hotels, Restaurants — Pacific Northwest Caterer and Steward (other publications alternated).

Miscellaneous — Western Baker, Western Confectioner and Ice Cream News, Pacific Dairy Review, Pacific Factory, Pacific Laundry Journal and Dry Cleaner, Western Machinery and Steel.

TYPICAL NEW ADVERTISEMENTS

Reduced Facsimiles

PLUMBER
RESTAURANT
DRY CLEANER

1

2

3

1 *Western Plumbing and Heating Journal carries this story of success, featuring the remarkable sales record of WM. B. OAKES, Wilmington, (Los Angeles Harbor).*

2 *All Coon Chicken Inns (Seattle, Portland, Salt Lake City, Denver) use gas for all purposes. Mr. A. A. ("Al") Knoernschild, widely-known proprietor of this chain, gives a remarkable testimonial. (To appear in five restaurant magazines.)*

3 *Owned and managed by women, Averill-Morgan Company of Hollywood, California, enjoys an enviable cleaning business. Gas is described in this advertisement as "the Unseen Helper" that contributes to customers' satisfaction. (Pacific Laundry Journal and Dry Cleaner.)*

NEWS STORIES

By Our Technical News Service

To May 1, 1933, a total of 43 feature and short articles (many illustrated) had been prepared especially for Pacific Coast trade journals and published by them. May was a record month in this activity, with the following 13 articles printed, making a grand total of 56 for the first five months of the year.

WESTERN MACHINERY AND STEEL WORLD

(1) **"Automatic Control of Gas Fuel"**—Advantages of automatic fuel control in all types of industrial utilization; description of devices for automatic regulation.

(2) **"New Bell-Type Retort Furnace"**—New gas furnace developed by American Gas Furnace Company for wide range of use.

(3) **"Atmospheric Immersion Gas Burners"**—Heating liquids with gas firing through immersed flue coils.

(4) **"Gas Fuel Throughout Plant"**—Forster Manufacturing Company, Berkeley.

PACIFIC COAST CHEF

"Gas Refrigeration"—Description of new gas-fired refrigerator.

PACIFIC FACTORY

(1) **"Gas Immersion Burners Used in Lead Coils"** Industrial heating by immersion unit method.

(2) **"Efficient Handling System for the Manufacture of Brick"**—Gas fuel for drying brick kilns at plant of Davidson Brick Company, Los Angeles.

PACIFIC DAIRY REVIEW

"Dairy Delivery Plant Marvel of Modern Dairy Industry"—Gas-fired boiler at new San Francisco plant of Dairy Delivery Company; automatic damper control.

PACIFIC COAST RECORD

"Italian Restaurant Success"—Gas-fired cooking equipment at new Los Angeles "Lucca's," recently opened mate to successful San Francisco restaurant.

WESTERN PLUMBING & HEATING JOURNAL

P. G. & E. Discussion Meetings—Merchant Plumbers.

WESTERN BAKER

Gas Oven—Hepburn's Bakery, San Francisco.

WESTERN RESTAURANT

(1) **"L. A. County Hospital Selects Equipment"**—Gas ranges for specially designed kitchen of new hospital.

(2) **"Coon Chicken Inn Expands During Depression"**—Gas-fired cooking equipment at successful Seattle restaurant.

MORE NEXT MONTH

Additional advertisements will be reproduced and more interesting facts presented, on this page in August Western Gas. **Send your comments to the P. C. G. A. office, 447 Sutter Street, San Francisco.**

New, Improved Types!

RELIANCE

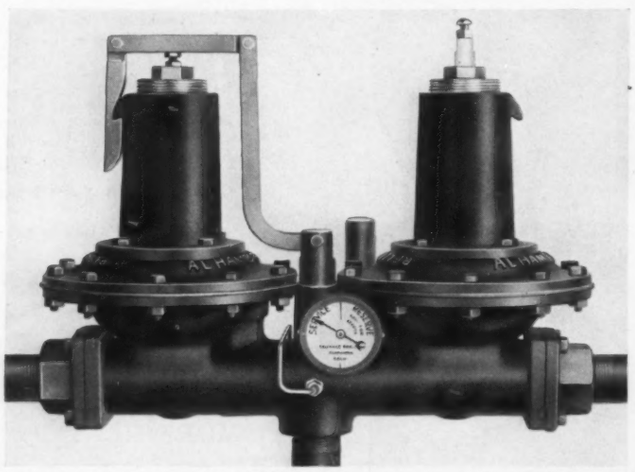
Liquid Petroleum Gas

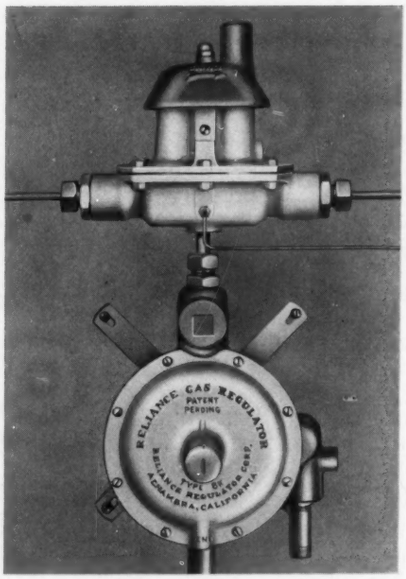
REGULATORS

For Absolute Pressure Control of Bottled Gas

THE new canopy top of the RELIANCE Type MR Primary Regulator insures against pulsation and has variable adjustment on pressures from the service cylinder. This canopy top also eliminates the possibility of rain, snow or dirt entering top casting thru protruding diaphragm stems. Arrow indicates the cylinder in service.

THE RELIANCE Type BK Regulator, used either as a primary or secondary regulator unit (as shown to the right), embodies these important features: Bell Crank Toggles; Straight Adjustment Spring which is Removable thru Adjusting Cap Screw, and a Handhole Plug which makes Valve and Valve Seat Accessible Without Disconnecting Threaded Pipe Connections. The "BK" is light in weight and is adaptable to any type of supporting bracket.





REGULATORS YOU CAN RELY ON — RELIANCE — SINCE 1908 — TRADE MARK

Above: Hook-up of Type MR (with canopy top) and Type BK Regulators. Lower Left: Type MC Regulator

The RELIANCE Type MC Primary Regulator is made for large semi-industrial or commercial installations and is equipped with a positive spring loaded mechanism. Large size RELIANCE Type H Regulators can be employed as secondary regulating units to further reduce pressures for proper utilization.

The same indicating device can be used with either MR or MC Regulators.

RELIANCE REGULATOR CORPORATION

1000 MERIDIAN AVE., ALHAMBRA, CALIFORNIA

SALES—SERVICE

NORTHWEST GAS & ELECTRIC EQUIPMENT CO., Portland, Oregon
AMERICAN METER COMPANY—New York, Chicago, Pittsburgh, Philadelphia
MARYLAND METER WORKS—Baltimore
WESTCOTT & GREIS, INC., Dallas, Texas; Tulsa, Oklahoma
D. McDONALD & COMPANY—Albany
METRIC METAL WORKS—Erie, Denver, Kansas City, Birmingham
NATHANIEL TUFTS METER WORKS—Boston
PACIFIC METER WORKS—Los Angeles, San Francisco

BUTANE • PROPANE NEWS

Vol. 3, No. 7 July, 1933

Design of Butane-Air Plant at Three Rivers, Quebec

By E. P. COLLINS *and* G. T. FELBECK

Carbide & Carbon Chemicals Corp.

E. P. Collins

G. T. Felbeck

IN MAY, 1932, Three Rivers, Province of Quebec, Canada, was one of the two largest cities in North America not supplied with gas service of any kind. Although natural gas had been available and was used in this city some 50 years ago, the supply became exhausted and had never been replaced by manufactured gas. Meanwhile unsuccessful efforts had been made to supply gas to the city in the course of which several short mains were laid, and foundations were erected for a plant a few years ago.

The idea was revived, however, when the City Gas & Electric Corp., Ltd., of Montreal secured franchise rights to serve Three Rivers and Cap de la Madeleine and on May 14, 1932, a butane-air gas service was inaugurated for these adjoining communities. Construction of the plant was conducted by the owners from plans and specifications procured from the Carbide and Carbon Chemicals Corp., New York, N.Y. The 45,000 residents of Three Rivers and Cap de La Madeleine—formerly served only by electricity—are now receiving a dependable gas service as rapidly as main extensions can be justified.

It was originally planned to install a coal and water gas plant but the situation was changed with the discovery of a new nearby supply of natural gas, making it possible that this gas might be available for use at some future date. The owners then decided to erect a butane-air gas plant (Fig. 1), instead of the more expensive coal or water gas types. Their selection was based on the remarkably lower investment required for the completed butane-air plant and the feasibility of moving the gas-making equipment to another city should natural gas become available at Three Rivers within the next few years. The pressure gas holder and much of the butane plant equipment could be utilized for natural gas, so that the erection of the butane plant may ultimately result in the saving of thousands of dollars in plant investment if natural gas becomes available in reasonable volume for distribution in this city.

The selection of line and holder sizes and other similar factors were influenced by the proximity of natural gas and allowances made to accommodate it at a later date.

The population of Three Rivers is estimated at 35,000 and of Cap de la Madeleine at 10,000, a total presenting reasonable possibilities of load and profit to the development of gas service. These cities are inhabited, for the most part, by French Canadian people and dwellings are concentrated so as to permit a large number of services per mile of mains. A reasonable gas demand for industrial, hotel and restaurant service can be developed in these communities. The major business is the manufacture of paper pulp and cotton goods.

Investigation of published data for cities in Canada similar to Three Rivers led to the assumption that about 3,000 meters might be installed in approximately 5 years with a daily sendout of about 200,000 cubic feet at a heating value of 455 B.t.u. The minimum heating value by law in the Province of Quebec is 450 B.t.u. per cubic foot.

Limiting Factors for Design

The ordinary manufactured gas distributed in the United States has a heating value in the vicinity of 540 B.t.u. per cu. ft. A butane-air gas of this value will contain 16.9 per cent butane vapor and 83.1 per cent air by volume. The butane vapor is condensable and the air may be moist and both components react unfavorably to low temperature unless properly handled.

Fig. 1. Butane-air gas plant at Three Rivers, Province of Quebec, Canada.

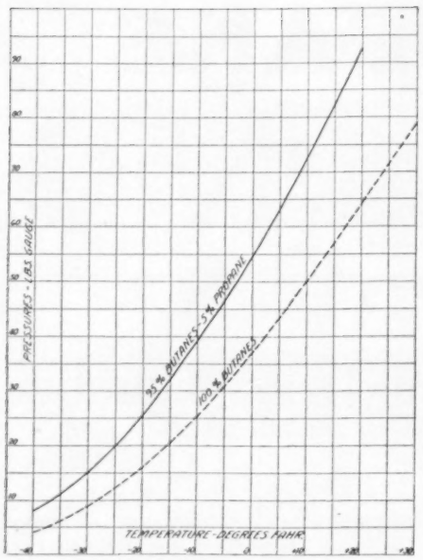


Fig. 2. Temperatures at which butane will condense from 455 B.t.u. butane-air gas at various gauge pressures. (Composition butane: 95% butanes, 5% propane.)

The boiling point of commercial butane averages from 15° to 20° F., according to its composition. Unless its partial pressure in a mixed gas is lower than its vapor pressure at a given temperature, butane will condense to a liquid whether in the holder, or distribution lines, (see Fig. 2) thereby reducing the B.t.u. value of the mixture. The air for dilution of the butane always carries moisture to some extent and unless this humidity is artificially reduced to a safe level, water is bound to be thrown out into the entire system when the temperature is lower than the dew point of the particular mixture with air. At pipe line temperatures below 32° F., ice would form from the condensed water and serious trouble would ensue.

The major necessity in designing this plant, therefore, was the production of an essentially dry and temperature-stable gas-air mixture for storage and distribution. Although some United States plants require no serious attention to the production of dry gases, dehydration is absolutely essential where an air carburetted gas is stored under pressure, when temperature 20° F. below zero may be experienced commonly (as in Three Rivers) and where distribution mains are above the frost line. Furthermore, it is necessary to limit the pressure on a gas holder to prevent condensation of butane while stored at such low temperatures. Sub-zero temperatures, therefore, limit either the percentage butane,—determining the heating value,—or the holder pressure, or both, and limit the permissible humidity to a low minimum.

The higher holder pressures, reaching 75 pounds in United States plants, become impossible at 20° F. below zero. Similarly, low pressure production of a necessarily wet gas—either for direct transmission to the city mains or for storage in a low pressure holder —becomes impractical when mains inevitably cool to temperatures considerably below 32° F. Therefore, the butane and air mixture must be handled so that there will be no condensation of water nor of butane, and specific control of these vital factors has been provided in the plant design at Three Rivers.

In Fig. 2 curves are shown for the temperatures at which condensation of butane will start in 455 B.t.u. butane-air gas at various gauge pressures. Curves for mixtures of higher heating value will be parallel to and below the curves for 455 B.t.u. The condensation pressures for a given temperature therefore vary inversely with the heating values. The higher the heating value therefore, the greater the holder volume must be to provide ample storage capacity at the lower pressures which produce condensation in a richer gas.

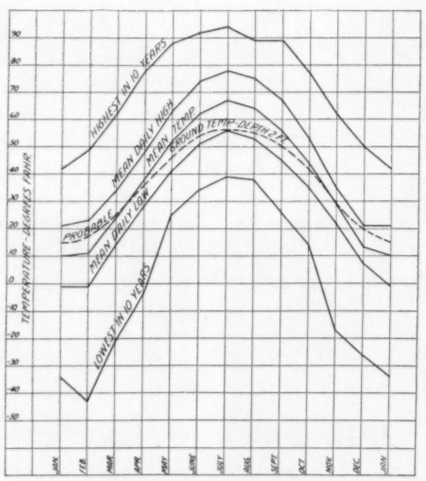


Fig. 3. Annual march of temperatures at Three Rivers, Province of Quebec, Canada.

From data supplied by the Director of Meteorological Service of Canada, a study of weather conditions prevailing in Three Rivers during the previous 10 years revealed that there are:

61 days per year at	0°	F. or lower
33 days per year at	—10°	F. or lower
19 days per year at	—15°	F. or lower
7 days per year at	—20°	F. or lower

Curves showing temperature characteristics and the probable pipe line temperature at a depth of 2 ft. are shown in Fig. 3.

From these facts, design for safe operation at —15° F. was deemed advisable since the 7 days at —20° F. can readily be taken care of by dropping the holder pressure. The important question, at this point, is whether butane can be kept from condensing and whether it is physically possible to keep from clogging the system with ice formation at these abnormally low temperatures for a butane plant. In the plants in the United States, to the author's knowledge, no such sub-freezing conditions have been faced and the set of conditions respecting air and ground temperatures and gas storage requirements present a new and interesting problem.

Condensation of Butane

A 455 B.t.u. butane-air mixture consists of 14.2 per cent butane vapor and 85.8 per cent air, the butane being 5 per cent propane and 95 per cent butanes. The condensing temperatures of butane in this mixture at various pressures are shown in Fig. 2. The dotted curve shows similar temperatures for the mixed gas, depleted in propane, after using gas from the vapor phase of the butane storage tank in warm weather. From these curves it may be seen that holder pressures up to 50 lbs. at —3° F.; of 40 lbs. at —10° F.; of 30 lbs. at —16° F. and 20 lbs. at —25° F., are permissible for 455 B.t.u. gas containing 5 per cent propane. Moreover, no butane can condense in the distribution lines at 2 lbs. pressure unless their temperature goes far below —40° F. It will be seen later that the final maximum holder pressure selected was 30 lbs., which produces no condensation of butane at temperatures down to —16° F. Satisfactory de-hydration of the gas was found possible at 30 lbs. and even at the reduced holder pressure of 15 lbs. when air temperatures are very low. Knowing the pressures which might be used for the storage holder, we may determine the best holder size to employ to meet the reserve needs of the community.

Size of the Holder

From a consideration of probable demands, it was estimated that 200 M c.f. would be sent out daily to 3000 connected meters, assumed in the fifth year of normal development. In view of the possibility of power or water failures, and other possible contingencies arising out of the relatively remote location of Three Rivers and the severe low temperatures experienced, a holder capacity of at least 40 per cent of the normal day's sendout in the fifth year, namely 80,000 cu. ft., was selected as an initial basis for calculations.

Storage of this volume in cylindrical pressure tanks at 30 lbs. pressure was impractical from a cost standpoint. Low pressure dry or wet holders could not be used and the remaining possibilities in pressure holders were the "bullet" type and the sphere. It was found that the standard Hortonsphere, (Fig. 1) 45 feet in diameter would hold 97,300 cu. ft. of finished gas at 30 lbs. pressure and after due consideration of other sizes and other pressures, it was selected as the logical holder. Its capacity between 30 lbs. and the distributing main pressure of 2 lbs. is 92,400 cu. ft. which provides, under normal conditions, 42 per cent of the day's sendout in the fifth year after the estimated peak hour. In case of a power failure, prior to a peak while storing gas at 20 lbs. holder pressure, there will still be 28 per cent of a full day's needs in the holder after a peak period. Although a lower temporary holder capacity for the first three years was considered, a greater ultimate investment was necessary and it was decided to provide holder capacity sufficient for the estimated daily demand for the fifth year.

Dehydration of Mixed Gas

Having determined a suitable storage pressure and selected a standard holder sufficient for the estimated needs of the plant, the question of water removal from the air-gas mixture assumed vital importance, first, due to hazards of ice formation in the plant and city lines and, second, on account of the possible corrosion to pipe lines and destructive effects of moisture on meters and diaphragms. Reference to curves in Fig 3 shows

(Continued on Page 26)

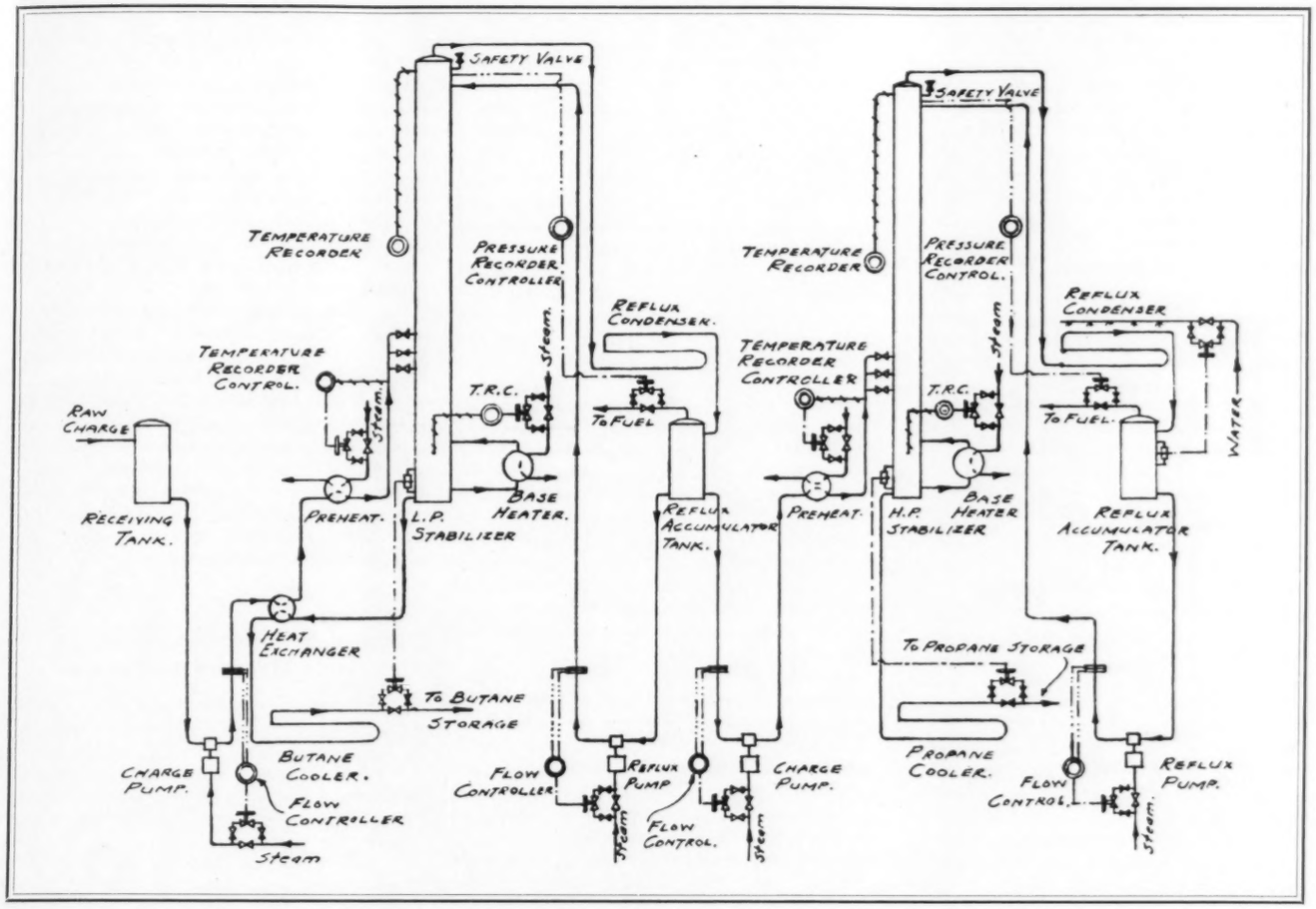


Fig. 1.

Liquefied Gas from Petroleum Refineries

By GEORGE A. BURRELL
and NELSON C. TURNER

Burrell-Mase Engineering Co.
Pittsburgh, Pa.

THE amount of gas produced at refineries, in 1929, was 520,000,000,000 cubic feet, according to Egloff and Morrel*, of which 270,000,000,000 came from cracking stills and 250,000,000,000 from straight run refining stills. While refinery gas varies in composition due to the nature of the cracking operation and the quantity of straight run refinery gas, yet it is probably safe to assume that all of the propane† and a part of the butane†, amounting to probably 10 per cent of the total gas, are available, with a modification discussed later in this article, for liquefied gas. Ten per cent of 520,000,000,000 cubic feet is 52,000,000,000 cubic feet, or about 1,700,000,000 gallons of liquefied gas. This is far beyond the marketed production of liquefied gas for 1932, namely, 33,000,000 gallons.

The handling, transportation, and use of liquefied gases have reached a commercial state of development so that trucks, tank cars, and cylinders, and storage tanks, piping systems, regulators, valves, burners, and the like, are available to handle them safely and economically.

Up to the present time, by far the greatest marketing outlet for liquefied gas has been along the eastern coast while the primary source of production has been those natural gasoline plants located in the Mid-Continent. The largest single item of expense has been that of freight. It is obvious that any refinery lying within the eastern marketing zone where delivery to the ultimate consumer could be made entirely by truck, would have a decided price advantage. This advantage would also apply to those refineries so located that transportation to the east can be made entirely by water. Since propane and butane are inevitable by-products in these refineries and at present are being used in most instances as a refining fuel replacing relatively cheap fuel oil, it seems quite likely that the near future will see many of these refineries entering this field, transporting the material either by pressure tank trucks, or by cargo-load or steamers or tankers in the case of refineries located on navigable water. In this latter case the liquefied gas would be transported to a bulk station, also on deep water, where it would be unloaded into pressure storage to be transported therefrom by pressure tank trucks, within a radius of 50 miles of the bulk station.

Under these circumstances with liquefied gas at 3c to 4c per gallon, f.o.b. refinery, it can be sold to the ultimate consumer at a cost comparable to manufactured gas at $1.00 per Mc.f., and leave a profit for the operation.

Technically the method of manufacture of liquefied gas from refinery gases does not differ appreciably from the methods used in manufacturing the same product in conjunction with natural gasoline plants.

Generally speaking, the proportion of propane to butane which is available is greater in a refinery vapor recovery plant than is the case in a natural gasoline plant, for as already stated, much of the butane is incorporated in motor gasoline. Therefore, handling and storage equipment should be provided for propane. Thus it will be heavy enough to withstand any quantity of propane which may be incorporated in the fuel.

The flow diagram of a typical plant to produce propane and butane is shown in Fig. 1. The charge to the plant is derived from the overhead of the final stabilizer of the vapor recovery plant. The charge is thus composed of butane and lighter gases.

* Ind. Eng. Chem., Oct., 1930.
† Includes propylene and butylene.

The raw gas, passing through a preheater and heat exchanger, enters the low pressure stabilizer from which butane is extracted at the base of the column. Propane is refluxed back in this column. The overhead product, a mixture of propane and ethane, mainly, passes to the high pressure column, in which ethane is refluxed back. Pure propane is withdrawn from the base. Thus the propane and butane are obtained in the pure state and can be mixed for distribution, in any percentage desired.

The pressures on the two columns depend upon the amount of propane passing overhead from the butane column, and the amount of ethane leaving the top of the butane column. Such a pressure must be employed to provide liquid reflux. Pressures are usually of the order of 300-400 lbs. on the butane column, and 400-500 lbs. on the propane column. Controls are such as to make the plant practically automatic.

One of the main problems which confronts the refiner is the determination of the quantity of propane which can be economically removed from the refinery vapors. In any refinery vapor recovery plant there is a certain quantity of propane (and propylene) which is inevitably removed along with the heavier hydrocarbons and is thus an unavoidable by-product. Under ordinary operating conditions, when over 98 per cent of the pentane and heavier is removed from the vapors, approximately 30 per cent of the butane is removed and less than 10 per cent of the propane.

Mathematically the percentage of any hydrocarbon removed from the gas may be expressed in the following formula:

$$E = 376 \frac{P\ V\ M_o}{R\ \Pi\ W}$$

For 1,000,000 cubic feet per day this would amount to a total of

$$\frac{1{,}000{,}000 \times .213}{38.2} = 5{,}580 \text{ gallons per day of propane.}$$

$$\frac{1{,}000{,}000 \times .082}{32.5} = 2{,}500 \text{ gallons per day of butane.}$$

$$\frac{1{,}000{,}000 \times .085}{25} = 3{,}400 \text{ gallons per day of pentane and heavier.}$$

R = Gallons of absorption oil circulated through the absorber per unit time.

Π = Absorber pressure in pounds per square inch abs.

W = Density of oil in lbs. per gallon.

P = Vapor pressure of the hydrocarbon under consideration at the absorber temperature in lbs. per square inch abs.

V = Volume of vapor passing through the absorber in unit time in cubic feet.

M_o = Average molecular weight of the absorption oil.

E = Per cent of hydrocarbon removed from the vapor by the absorption oil.

Thus it will be seen that over 10 times as great an oil rate is required to remove essentially all of the propane as is required to remove essentially all of the pentane and heavier.

Let us assume a specific case. Take for example a million cubic feet per day of a typical refinery gas of the following analysis:

Methane	33	per cent
Ethane and ethylene	29	per cent
Propane and propylene	21.3	per cent
Butane and butylene	8.2	per cent
Pentane and heavier	8.5	per cent
	100.00	per cent

In removing essentially all of the pentane and heavier from the gas with the minimum oil rate, one-third of the butane, or 840 gallons will be removed, and one-tenth of the propane, or 558 gallons. The average refinery will be able to utilize the entire 840 gallons of butane so that this leaves only the 558 gallons of propane available for liquefied gas.

Under average operating conditions this quantity of hydrocarbons could be removed by circulating 28,000 gallons of absorption oil per 1,000,000 cubic feet of vapor, and the quantity of liquid absorbed = 3,400 + 840 + 558 = 4,798, or approximately 6 gallons of absorption oil per gallon of liquid hydrocarbon removed.

If the oil rate is tripled practically all of the butane and approximately 30 per cent of the propane will be removed. Thus for an additional oil circulation of $2 \times 28{,}000 = 56{,}000$ gallons, we obtain $2{,}520 - 840 = 1{,}680$ gallons of butane, and $(0.30 \times 5{,}580) - 558 = 1{,}116$ gallons of propane, or a total of 2,796 gallons of additional liquid. This amounts to 20 gallons of additional oil per additional gallon of liquid removed.

In order to remove essentially all of the propane the oil rate must be increased to 280,000 gallons per million, or an increase of $280{,}000 - 84{,}000 = 196{,}000$ gallons of oil for an increase in $5{,}580 - (558 + 1{,}116) = 3{,}906$ gallons of additional liquid, or 50 gallons.

The cost of operating a vapor recovery plant is primarily a function of the quantity of absorption oil circulated so that the cost per gallon of liquid hydrocarbon produced is measured by the number of gallons of absorption oil which it is necessary to circulate in order to obtain it. Thus it will be seen that in estimating the cost of producing liquefied gas, three different costs must be used, depending on the percentage of material to be removed.

Under present prices of liquefied gas it is doubtful if there are any instances where it would pay to remove the last 70 per cent of the propane.

The question has been raised as to the possibility of gum formation in pilot light, lighters and the like, when liquefied gas from refineries is used, since it contains, in addition to the paraffin hydrocarbons, various unsaturated hydrocarbons in the same boiling range. The authors know of no instance where such gum formation has been encountered. This is probably due to the fact that the method of handling and storage is such that little or no oxygen ever comes in contact with these unsaturated products.

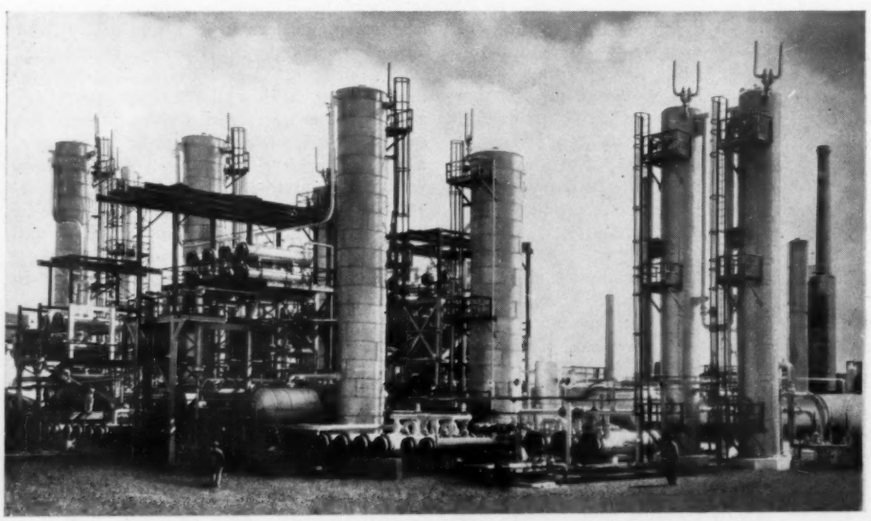
Industrial Accident Commission May Check Unfired Vessels

Following the explosion and fire in Richfield Oil Co.'s Meader No. 9 absorption plant at Long Beach, Calif., June 2, which caused loss of nine lives, the Coroner's Jury of experts found that the explosion was due to the overfilling of unstabilized casinghead storage tanks.

It is believed that the State Industrial Accident Commission hereafter will be given authority to check unfired pressure vessels. Up to this time the commission has exercised supervision over fired boilers, no check having been required on unfired vessels.

Sun Oil Co. Launches Refinery Propane Program

PROPANE recovery equipment at a Sun Oil Co. refinery is shown in the view below. The Sun Oil Co. recently announced a $4,000,000 expansion program for its refinery branch, a large part of the budget to go toward fitting the Marcus Hook, Pa., Toledo, O., and Yale, Okla., refineries to produce propane on an extensive scale. A. E. Pew, Jr., vice-president of Sun Oil's engineering and development department, informs *Western Gas* that marketing operations on propane will be started around July 1. Sales department personnel training has been under way for the past several months.



Imperial Gas Moves to Los Angeles; Will Merchandise Appliances

IMPERIAL GAS CO., pioneer bottled gas operator on the Pacific Coast, has announced removal of its headquarters from Long Beach, Calif., to Los Angeles. A long-term lease has been taken on a building at 4212 South Broadway, giving the company 15,000 square feet of floor space. A large shop and garage are accommodated in the rear of the building.

With the move to new quarters Imperial Gas has completed arrangements to display and merchandise a full line of liquid gas burning appliances. Ranges and water heaters will be marketed in the name of Rockgas, which is the registered trade name of the company's product. Space heaters, radiant heaters, furnaces, the Electrolux air-cooled gas refrigerator, camp stoves, Welsbach gas lights, Hart brooders, special burners, special commercial appliances such as plumbers' pots, sterilizers, torches, are among the products which the company will now display and sell.

A new fuel going by the name of "Econogas"—a combination of Rockgas and a heavier oil product—has also been introduced by Imperial Gas Co. for water heating and heavier work.

Located at the new offices are A. N. Kerr, W. J. S. Burdick, and C. L. Kerr, president, vice-president and secretary, and treasurer, respectively of Imperial Gas; and A. R. Howson of Rockgas Utilities Co., a subsidiary company also headquartering at the 4212 South Broadway offices.

Bottled Gas Group and Compressed Gas Men Affiliate

The affiliation between the National Bottled Gas Association and the Compressed Gas Manufacturers Association has been ratified and is now in operation, according to word received from Mark Anton, president of the National Bottled Gas Association. The two groups have retained their individual identity, and F. R. Fetherston is secretary for both. Mr. Fetherston's offices are at 110 West 40th Street, New York, N. Y.

Building 25-Million Cubic Foot Natural Gasoline Plant

The Burrell-Mase Engineering Co., is building a natural gasoline plant for the Owens-Libbey-Owens Co., of Charleston, W. Va. The plant will be capable of handling 25 million cubic feet of gas per day.

New Mississippi Company to Distribute Bottled Gas

The Industrial Gas and Equipment Co., Inc., has been formed at Starksville, Miss., to distribute gas burners and to sell bottled gas. F. E. Waldrop is president.

May Build Plant at Sullivan, Mo.

The Parker-Russell Co. of St. Louis, Mo., with L. J. Dugan as representative, is reported to be planning construction of a plant for the service of liquefied petroleum gas in Sullivan, Mo.

TWO TO ONE

There are TWO Hackney liquefied gas cylinders in service—to every ONE *of all others combined.*

Having designed and built cylinders for Butane, Propane, and Propane-Butane mixtures from the very first—Hackney may be accurately called headquarters for liquefied gas cylinders.

The fact that more than twice as many Hackney liquefied gas cylinders are in service today as all others combined—indicates the uniform quality, superior design, and lower ultimate cost.

That, plus the fact that Hackney serves virtually all of the largest users, indicates confidence. These users include: Skelgas Co., Shell, Standard, Philgas, and users of cylinders for other gases—Cheney Chemical Co., R. & H. Chemical Co., Mathieson Alkali, Air Reduction Sales Co., etc.

All users are invited to make use of this extensive and intelligent service.

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208 S. LaSalle St. Bldg., Room 1185, Chicago, Ill.
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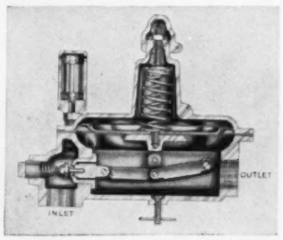
CONTAINERS FOR GASES, LIQUIDS AND SOLIDS



REYNOLDS GAS CONTROL SINCE 1892

Reynolds Products—

Products for all kinds of Pressure Reduction—for either artifiicial or natural gas.

GOVERNORS—Intermediate Pressure, Triple Outlet, Holder, Toggle Type Street.

REGULATORS—High Pressure Service, Low Pressure Service, High Pressure Line, Single and Double District Station.

VALVE—Automatic Quick-Closing Anti-Vacuum Relief, Cut-off. Model 30: manufactured for vertical or horizontal connections.

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Butane as Stand-by for Mixed Gas

By O. R. ALLGEIER
Engineer
The St. Louis County Gas Company
Webster Groves, Missouri

Fig. 1. The St. Louis County Gas Co.'s 150,000-gallon butane storage tank.

THE 800 B.t.u. gas being served to its gas customers in St. Louis County, Missouri, by The St. Louis County Gas Co. is composed normally of blue water gas and Louisiana natural gas. Normally the proportions of these two gases are approximately 25 per cent and 75 per cent, respectively; but provision was made in the natural gas contract for enriching the manufactured gas by oil carburetion, or other means, to a maximum heating value of 650 B.t.u. This provision was made for load factor correction purposes, since the natural gas is sold to us on a demand and commodity price basis, and not for caring for the emergency which would arise from an outage on the natural gas line.

The possibility of such an outage was by no means overlooked, however. In fact, a great deal of thought was given to it in conjunction with various methods of providing the higher heating value manufactured gas for load factor improvement. Economic studies were made of all the available processes for manufacturing and reforming gas in the existing water gas generating equipment, and after finding that none of them appeared feasible in our situation as compared to the standard carburetted water gas process, it was decided that a quantity of stored butane to be used for enriching carburetted water gas to a usable heating value would be the most practical standby. After making calculations, and checking them with tests on the various types of gas burners, we arrived at a heating value of 900-925 B.t.u. per cubic foot as the proper one for a butane-enriched carburetted water gas which would be a usable substitute for the normal 800 B.t.u. blue-natural mixture.

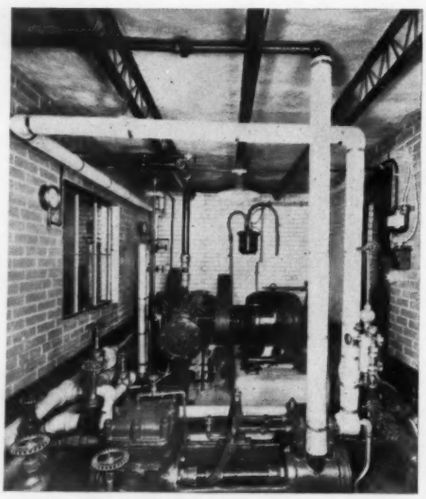

Fig. 2. Electric motor driven compressor (9 in. x 8 in.) used for moving butane into and out of storage.

The question of how much butane to store so that we could withstand a natural gas outage of unlimited duration was not difficult. In our situation we are rather favorably located with respect to butane supply. We can obtain deliveries in three days from Oklahoma refineries, and several large refineries and one tank farm where large quantities of butane are stored, are located within 24-hour shipping time. Thus it was necessary for us to store only enough butane to assure ourselves that we could replenish our stock before it would be depleted during a period of maximum load. Estimates of load growth, etc., showed that 150,000 gallons of stored butane would last more than three days under heaviest load conditions estimated for three years in the future.

Accordingly 150,000 gallons of butane storage was decided upon and after studying economical tank sizes, etc., a single vertical hemispherical ended tank of this size was purchased. Fig. 1 shows this tank. The tank is 22 feet in diameter and 48 feet 9 inches from spring line to spring line. The unit has capacity sufficient to hold the 150,000 gallons with about 20 per cent for vapor space. The tank was designed for a working pressure of 80 lbs. per sq. in. gauge and tested at 130 lbs. per sq. in. gauge. Six 4-inch atmospheric relief valves set to relieve at 80 lbs. per sq. in. gauge were installed

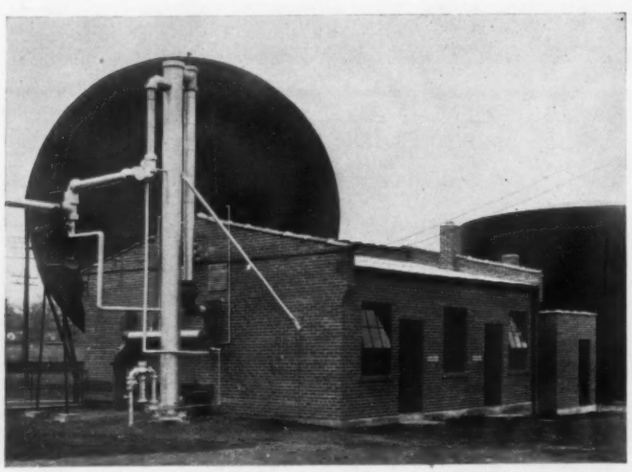

Fig. 3. View of mixer house, showing also the butane vaporizer and 45-foot, spherical, all welded diffusion tank through which mixed gas passes to distribution mains.

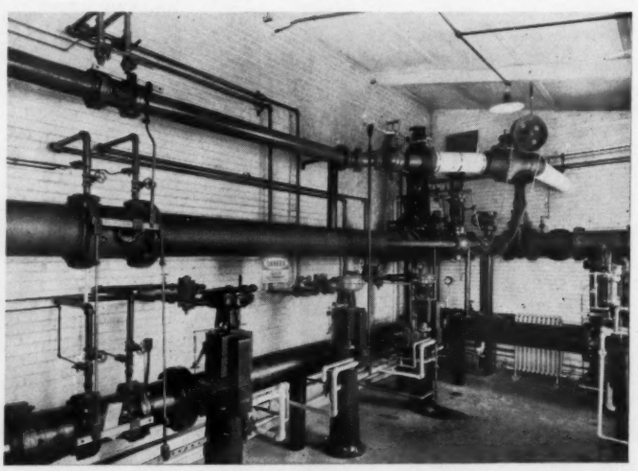

Fig. 4. Interior of mixer room, showing regulators and piping for the enrichment of manufactured gas with either natural gas or butane.

in the upper dome manhole. Three 2-inch connections were made through the upper dome. One of these serves as a repressuring line, another as a blow-down line, while the third is a spare. Each of the three is equipped with a 2-inch slug check designed to close upon excessive out flow. Three 3-inch connections were installed through the bottom dome. They serve as filling connection, emptying connection and spare. Each of the 3-inch connections is equipped with a "Christmas tree" consisting of three 2-inch slug checks manifolded together. For gauging the liquid content of the tank nineteen 48-inch gauge columns were installed through the height of the liquid space. These gauge columns overlap each other and a graduated scale permits reading the liquid level at any point. Each end of each gauge column is equipped with a shut-off cock and a ball check. The temperature of the liquid is measured with a remote bulb thermometer installed in a well extending to the vertical center line of the tank. Pressure gauges show pressures at bottom and top of the tank.

The butane is moved into or out of storage by the pressuring method. The small electric motor driven compressor shown in Fig. 2 is equipped with both a constant speed unloading type control and an on-and-off constant pressure governor. When tank cars of butane are to be unloaded into storage the constant speed unloading type control is used. Manufactured gas is compressed into the vapor spaces of the tank cars, the pressure being adjusted manually to equal the pressure head on the unloading line plus the friction loss in the piping. Excepting when cars are being unloaded, the compressor operates on the on-and-off pressure governor, maintaining a pressure of 60 lbs. per sq. in. gauge on the liquid line from the storage tank to the vaporizer.

The vaporizer, shown in the left foreground of Fig. 3, is designed to vaporize 120 gallons per minute of butane. The heat is supplied in the form of boiler steam which surrounds the seventy-two ¾-inch by 24-foot tubes up which the butane passes. No pressure regulator was installed in the liquid line; but as a safety measure, to prevent liquid from passing through the vaporizer, a pilot controlled liquid shut-off valve was installed. This valve remains open, unless boiler pressure does not exist in the steam space of the vaporizer. If this pressure fails, the valve closes, shutting the unit down. Duplicate steam traps were connected to the bottom of the steam space to insure against possible water-logging of the steam space, with the consequent failure to vaporize the butane.

The brick building in Fig. 3 is the mixer house where regulating equipment for automatically enriching manufactured gas with natural gas or butane is housed. The butane vaporizer was located as closely as possible to this house and the butane vapor line leading from the vaporizer to the butane vapor regulating valve inside the house was thoroughly insulated to minimize condensation.

An inside view of the mixer house is shown in Fig. 4. The 12-inch bottom pipe is the manufactured gas line, the 12-inch middle pipe the natural gas line, and the 6-inch

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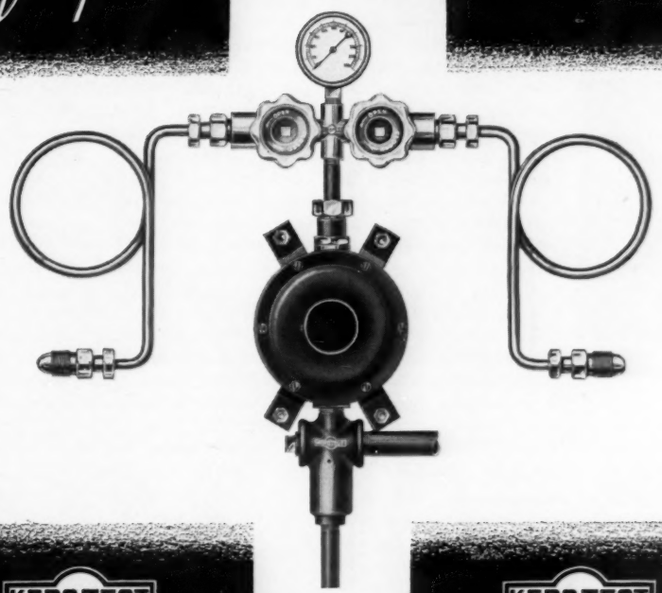
KEROTEST
PROPANE MANIFOLDS
forged *brass*



KEROTEST KEROTEST

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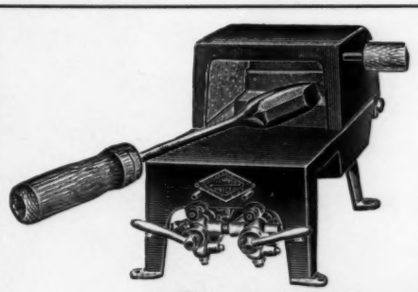

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Gas Generators for Commercial and Semi-Industrial Users

By J. J. DELANEY

Reliance Regulator Corporation, Alhambra, California

DUE to the recent growth of the liquefied petroleum gas industry, there have been some demands for apparatus that would successfully and economically vaporize liquefied petroleum gases composed of some of the heavier hydrocarbon constituents, such as butane, etc. It has been successfully proven that practically all the liquefied petroleum gases could be efficiently utilized in small semi-portable installations, consisting of small cylinders, regulators, cabinet, and ordinary fittings. Other commercial and semi-industrial problems have arisen which require more elaborate systems to properly vaporize these various hydrocarbon liquids and by so doing secure proper efficiencies from these fuels on the larger type jobs.

J. J. Delaney

The Reliance Automatic Gas Generator was designed to act as a compact gas generating plant in order to supply these isolated semi-industrial and larger commercial users with a type of gas service comparable to that of their more ideally located city brothers. The accompanying photograph gives a general view of the gas generator with metric meter and Reliance automatic safety regulator attachment, and it also shows a water heater which was used as a medium for heating the water used in the generator.

The liquid fuel is piped from large capacity storage tanks to the inlet of the liquid regulator and the liquid pressure is reduced from the varying storage tank pressure, depending on atmospheric temperatures, to the adjustable outlet pressure of from 3 to 10 lbs. The liquid expanding through the valve of the liquid regulator enters into a closed coil expanding tube, where water on the external side of the coil transmits heat into the dense vapor and whatever liquid is not vaporized in the escapement through the liquid regulator valve. The vapors gradually increase in temperature to the point where they leave the generator, and the complete vaporization becomes more perfect as the molecules expand. The vapors entering the bottom of the generator discharge at a point near the top into the head of the generator and are passed down through this head to the inlet of the second vapor regulator, which in turn reduces the pressure from 3 to 10 lbs. to outlet pressures of between 6 and 12 inches of water. The vapor discharge from this regulator then proceeds into the No. 1 expansion chamber, and where it is necessary to reduce the 6 to 12 inches of water pressure still lower a secondary regulator is installed that is capable of reducing pressures to ½ inch to 4 inches of water. The vapor then escapes into the second expansion chamber, proceeds through the meter, and can then be distributed in any satisfactory manner devised.

Expansion chambers were included in the design of the unit so as to act as reservoirs of supply and thus take care of quick demands from the consumer. A relief valve is placed on the generator between the liquid regulator and the vapor regulator, which can be set at any desired pressure, supplying full protection in case of sudden stoppages of load demand. An added safety feature is also incorporated in that a liquid level control is taken from the center of the expanding coil and automatically and independently from the main liquid control valve closes off the source of liquid supply if for any reason the master liquid control valve should fail and allow the liquid to build up in the lower portion of the expanding tube. This feature doubly protects and insures the safe operation of the unit. An additional safety shut-off valve can be placed on the main distribution line leaving the meter, that would operate only when a break in the main distribution line occurred, or when the distribution pressures become dangerously low. This valve would then close down the vapor supply entirely from leaving the generator, and to place the system back in operation it would be necessary to manually reset this valve.

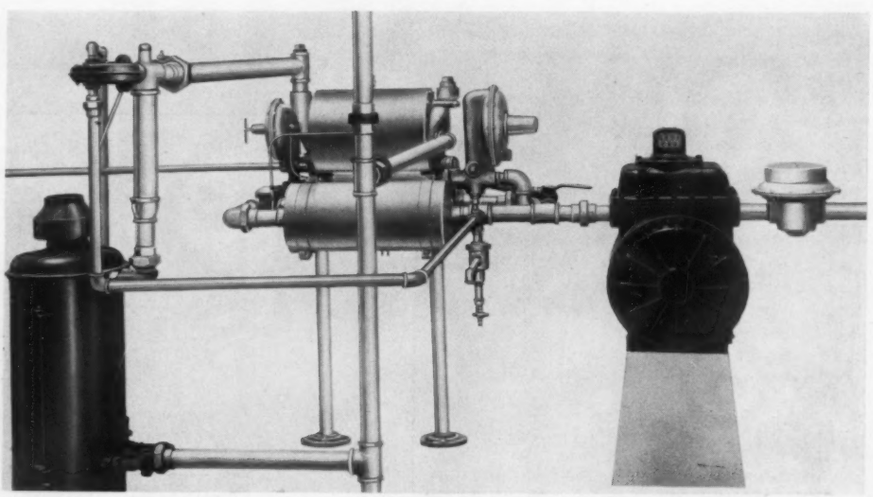
The unit is capable of generating 2,000 cu. ft. of 3,000 B.t.u. vapors per hour; the vapors generated are completely gasified, with no indication of heavy liquid particles. Liquid can be fed into the inlet of the liquid regulator by its own exerted pressure, or to insure positive feed during low temperature conditions when the vapor pressure in the storage tank is extremely low the liquid can be fed into the regulator by gravity, depending entirely upon the placement of the storage tanks.

Several methods of heating can be applied to the generator and successful use has been made of hot water, hot air or exhaust gases from engine manifolds. The unit is equipped to utilize any of these methods. Different piping arrangement is all that is necessary to effect these changes. The accompanying picture shows an installation where hot water was employed, and on this type of installation it becomes necessary to install a small reservoir several feet higher than the generating apparatus so that a liquid head can be maintained against the water jacket side of the generator and through the water heater to insure proper circulation of the hot water.

Where this generator is used for gas engine work it is necessary to install an air mixing valve which will proportion the amount of vapor for proper utilization. On installations of this kind the generator can be equipped with an automatic backfire valve. By means of this valve, should the engine close down the regulator immediately shuts off the flow of vapor and does not come into operation again until the engine is turned over and the suction produced by the engine lifts the control, allowing the vapor to feed through in its proper cycle.

Where engine exhaust gases are used as a heating medium all of the exhaust gases can be fully by-passed through the generator, or with a butterfly control valve thermostatically operated enough of the exhaust gases can be diverted through the generator to maintain any desired temperature.

Dimensions of the generating unit shown in the accompanying view are 24 x 24 x 36 inches, and as shown, the unit can be mounted on any varying length type of pipe stand. Supporting brackets which carry the generator and two receivers are part of the standard unit.



Reliance automatic gas generator.

Butane-Propane Service for Acqueduct Construction Workers

A BUTANE-PROPANE plant of the undiluted type was constructed during June, to go into service before the end of the month at the Thousand Palms construction camp of the Metropolitan Water District, in the Coachella Valley, Calif. American Liquid Gas Co. of Los Angeles, of which H. W. Smith is president, designed and constructed the plant, and has the contract to supply it with liquified petroleum gas fuel for a period not to exceed five years.

The contract carries an option on building and supplying fuel to five additional plants at camps located at Wide Camp, Pushawalla, Berdoo, Fargo, and/or Yellow Camp for the Metropolitan Water District. The camps are all located on the Colorado River Aqueduct route and are of permanent construction.

Butane-propane will furnish essential fuel service in water heating, space heating, cooking and miscellaneous uses. At the Thousand Palms camp where the initial plant is located there are four 20-men dormitories, six 4-men dormitories, an office, mess hall, commissary, warehouse, shops, hospital, etc., together comprising a considerable fuel load.

The plant designed by American Liquid Gas is of 3,000,000 B.t.u. hourly capacity. A 4,000-gallon liquid storage tank is a part of the installation, the tank being fabricated by Southwest Welding and Manufacturing Co. of Alhambra. Approximately 900 feet of 3-inch pipe and several hundred feet of 1¼-inch pipe tying in the various buildings will constitute the distribution system.

The gas served will be a mixture of butane and propane, varying with seasonal requirements to maintain about 3,000 B.t.u. content. American Liquid Gas is securing the fuel from General Petroleum Corp.

Work began in May on the $220,000,000 Colorado River Aqueduct, which will bring 1500 second feet of water from the Colorado River to the 13 cities in the Metropolitan Water District of Southern California, and which involves the boring of some 91 miles of tunnel through intervening mountains.

Southwest Welding and Mfg. Co. Making New Line of Butane Tanks

WITH the increasing trend toward wider use of butane, Southwest Welding and Manufacturing Co. has developed and is manufacturing a line of tanks for both stationary and auto truck installation.

The auto trucks have been fabricated with the idea of keeping weight at a minimum without detracting from the safety factor of the equipment in usage. These tanks are so mounted as to provide for their load of butane being dumped directly into subsidiary tanks or containers. Shielded arc welding is used in the fabrication.

Southwest Welding Co.'s butane tanks are constructed to handle 100 to 10,000 gallons of butane. Necessary relief valves have been installed to take care of the expansion of the butane and all tanks have been constructed to comply with the A.S.M.E. Class 1 Welding Code, as well as the California Unfired Pressure Vessel Code.

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Natural, Manufactured, Butane and Propane Gas

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GROBLE GAS REGULATOR COMPANY

Office and Factory: Anderson, Indiana

TABLE NO. 1. DEW POINTS OF DEHYDRATED MIXED GAS.
(Composition: air = 85.8% Butane = 14.2%)

Month	Mean daily high temp. °F.	Lbs. water per M ft. air saturated	Lbs. water per M cu. ft. of actual vol. measured at 2 lbs. pressure and mean daily high temp. after compression to 30 lbs. and 15 lbs., cooling to mean daily high temp. and expanding to 2 lbs. pressure		Saturation Temp. °F. at 2 lbs. gauge	
		@ 0 lbs. gauge	*30 lbs.*	*15 lbs.*	*from 30 lbs.*	*from 15 lbs.*
Jan.	21	0.185	.069	.091	1	6
Feb.	23	0.203	.076	.101	3	9
Mar.	34	0.327	.122	.162	13	19
Apr.	48	0.547	.205	.271	24	30
May	63	0.917	.343	.454	37	44
June	74	1.310	.490	.648	47	54
July	78	1.485	.555	.735	50	58
Aug.	75	1.352	.506	.670	47	55
Sept	67	1.046	.392	.518	40	47
Oct.	53	0.653	.244	.323	28	34
Nov.	35	0.340	.127	.168	14	20
Dec.	21	0.185	.069	.091	1	6

Design of Three Rivers Butane Plant

(Continued from Page 18)

that from January to April and from the middle of October to January, the probable pipe line temperature at a depth of 2 feet is either equal to or higher than the mean daily atmospheric temperature.

If the pipe line temperature in the winter were above 32° F., no insurmountable trouble from moisture in the mains would be found, but from Fig. 3 it is evident that main temperatures as low as 17° F. may be anticipated and dehydration, therefore, becomes imperative in winter.

From April through to October, the probable pipe line temperature is lower than the mean daily atmospheric temperature. Without dehydration, it is immediately evident that the moisture in the warmer gas from the holder would condense in the distribution lines during the spring, summer and early fall months, making it necessary to blow the drips frequently and with possible accelerated corrosion in the lines.

The mains would contain a practically dry gas for about six months and then a wet gas for six months, thereby introducing a serious problem in the maintenance of meters and regulators whose diaphragms would be alternately wet and dry. In addition, a continuous service problem would be presented during the entire winter in the thawing of frozen house service connections and meters with the accompanying probability of a complete stoppage in the distribution system when the ground temperature is below freezing and the atmospheric temperature relatively high. For example, in January the temperature of the mains will probably be 15° F. with a possible atmospheric temperature of 42° F. (Fig. 3); a rain storm under these conditions would probably result in a frozen main from the plant unless the gas is dried sufficiently to drop its dew point below 15° F. at the pressure existing in the distribution system.

The necessity of sending out a dry gas prevented adoption of low pressure operation of the plant. Some study was given to the possibility of sending gas directly to the distribution lines from blowers at from 2-5 lbs. pressure, meanwhile maintaining a reserve supply in a dry holder either at low pressure or at about 30 lbs. However, the amount of moisture which can be removed from the mixed air and gas at pressures up to 5 lbs. is entirely inadequate to drop the dew point to a safe margin below 15° F., without the use of low temperature refrigeration, or an absorption system of gas drying. For example, if during March, when the ground temperature is about 25° F., air saturated at the mean daily high temperature for March of 34° F. were mixed with butane and compressed to only 5 lbs. pressure without some auxiliary means of drying, its dew point would be only 37° F.

Obviously, during the winter, considerable water would condense from such a gas in the distribution lines to freeze there at the existing temperature of 25° F. Similarly, quantities of water would be thrown into the mains during the seasons from April to October and the use of 5 lbs. or less is, therefore, impossible without some auxiliary method for drying the gas. Consideration of the refrigeration and solid absorbent methods of gas drying showed them to be less desirable in this instance than the method of compressing the gas to a higher pressure with water cooling of the gas in aftercoolers. (Fig. 9). The compression method was selected, therefore, and the plant designed to operate on this basis.

Compression Method of Drying

It will be of interest to review briefly the elements of the compression method of gas drying. The air used for gas making must be assumed 100 per cent saturated at the mean daily high temperature for the sake of safety. The mixed gas made from this air is virtually saturated when it enters the compressors where its pressure and temperature are both raised. It then passes through an aftercooler and then through underground pipes at ground temperature to the holder where it is exposed gradually to the atmospheric temperature. Thereafter, it is withdrawn through lines, again at ground temperature, to the station regulators and then expanded from about 30 lbs. to 2 lbs. gauge. It then passes into the distribution mains at ground temperature.

The effect of temperature in this sequence of events is important in its influence on the water content of the gas. The mixture leaving the compressors is relatively hot and partially saturated with water vapor. As the gas passes through the aftercoolers, it is cooled suddenly under 30 lbs. pressure and about two-thirds of its contained moisture is immediately removed at 10° F. above the temperature of the cooling water. The gas is further cooled when passing through the underground line to the holder so that some water will condense in this line also. Its temperature is gradually reduced to that of the atmosphere while in the holder and further condensation may be expected there.

When the cold gas leaves the holder, however, it enters a line underground, between the holder and the compressor building, at a temperature more often higher than the holder temperature in winter so that no further condensation in underground lines should occur after the gas leaves the holder. It passes to the station regulators where it is expanded to 2 lbs. pressure and, of course, becomes highly unsaturated at once with a marked lowering of the dewpoint. Thereafter it travels through underground lines at reduced pressure and no further condensation may be expected provided its dew point is lower than the temperature of the underground lines.

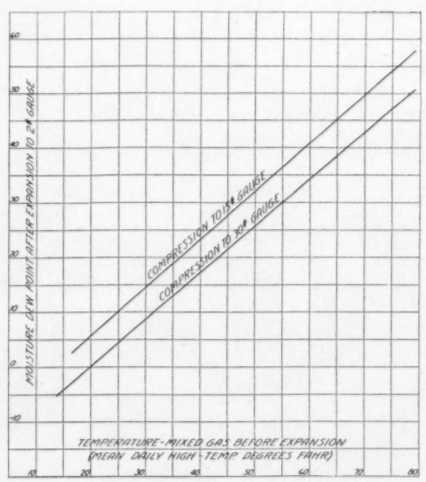

MOISTURE DEW POINT AFTER EXPANSION TO 2# GAUGE
COMPRESSION TO 15# GAUGE
COMPRESSION TO 30# GAUGE
TEMPERATURE - MIXED GAS BEFORE EXPANSION
(MEAN DAILY HIGH TEMP DEGREES FAHR)

Fig. 4. Temperatures at which moisture will condense from 455 B.t.u. butane-air gas.
(Mixed gas saturated after compression and cooling to mean daily high temperature. Expanded pressure 2 lbs. gauge in mains. Composition: 14.2% butane, 85.8% air.)

The effect of drying the mixed gas through the use of such aftercoolers is shown in Table No. 1 and values have been plotted on the curves shown in Fig.s 4 and 5.

The curves in Fig. 4 show the temperatures at which water will condense from a 455 B.t.u. gas-air mixture, where the mixture is saturated at the mean daily high temperature after passing through the aftercoolers and holder at either 15 lbs. or 30 lbs. gauge and after final expansion to 2 lbs. gauge into the distribution system. The values of dew points plotted on Fig. 5 with probable ground

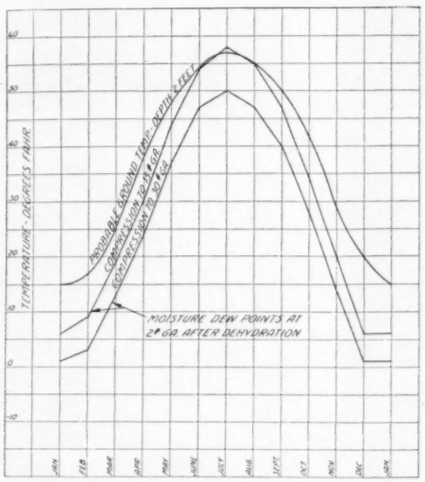


Fig. 5. Comparison of probable ground temperatures with moisture dew points of 455 B.t.u. butane-air gas.

(Mixed gas saturated after compression and cooling to mean daily high temperature. Expanded pressure 2 lbs. in mains.)

temperatures show that water will neither condense in the mains at any time during the year using a 30-lb. holder pressure at atmospheric temperatures down to −15° F., nor at gradually lowered holder pressures as the atmospheric temperature drops below −15° F. The distribution system will, therefore, be dry in summer as well as in winter in spite of the severity of the low temperatures at Three Rivers.

Although the dew points shown for gas compressed to only 15 lbs. are generally satisfactory, provision has been made for inserting a back pressure regulator in the discharge line from the compressors to provide dehydration at all times at a 30-lb. pressure even though the holder pressure may be only 15 lbs., to prevent condensing butane liquid. This 30-lb. pressure assures maximum drying and the plant will undoubtedly operate with the back pressure control during the next winter.

During the winter of 1932-33, the usual low winter temperatures at Three Rivers were experienced. Some of these are averaged by weeks and are shown in Table No. 2 along with the weather prevailing during each week. It will be noted that not only low temperatures prevailed during this five weeks period but wide changes in temperature were impressed on the holder and the air used for gas making.

On December 31, 1932 a temperature of 32° F. was recorded outdoors at 1 A.M. with

TABLE NO. 2

Week Ending	General Weather for Week	Temp. Outdoors —°F.— Min.	Max.
Dec. 17	Cold—Snow	−20	22
Dec. 24	Cold—Snow—Clear	−14	38
Dec. 31	Cold—Snow—Cloudy	− 8	42
Jan. 7	Rain—Clear—Snow	−12	38
Jan. 14	Rain—Clear—Cloudy	−10	36

rain and snow falling; the air temperature dropped to −8° F. with no snow at midnight of the same day. This condition demonstrated the efficiency of the dehydration method since incomplete drying under these conditions repeatedly would lead to ice formation.

Removal of condensed water is effected by the use of special drip receivers designed for the removal of holder condensate and of condensate from the aftercoolers. Common drip pots in the distribution system take care of the unusual case where water may appear in the main lines. The drip tank for the holder and its blow-off valve are located vertically under the holder inlet pipe below the frost line. (Fig. 6.) The inlet line has been carefully insulated from below the frost line up to the outside of the holder to prevent freezing. The flow of warm gas into the holder serves to keep the inlet line free from any quantity of frost. The inlet pipe extends inside the holder for a distance of 3 feet and is provided with slots to permit any water condensed within the holder to run down the inlet pipe to the drip receiver. There is little doubt that some ice is present at the bottom of the holder during the winter and if means were not provided to prevent this ice from sliding down over the inlet opening on a warm day, it might be impossible to refill the holder. This emergency is provided for by the 3-foot extension pipe. Condensate from the aftercoolers is removed in a baffled receiver which has a blowoff connection discharging from above ground through a gas trap.

From experience during the past winter, it is of interest that the dehydration of the mixed gas has actually been accomplished almost completely through the action of the aftercoolers and practically no drying has been effected by the low temperature the gas reaches while in the plant lines and the holder. Practically all of this condensate has been caught in the special drip receiver provided just after the aftercoolers. None has been found in the drips in the distribution system and practically none in the special drip receiver under the holder.

Plant Capacity

From consideration of the probable peak demands, the day's sendout and the holder capacity, two Ingersoll-Rand compressors were specified initially, each rated at 10,000 cu. ft. per hour at 30 lbs. pressure, one of which will provide standby service and serve to equalize wear. The plant capacity may be increased to 40,000 cu. ft. per hour, or more, whenever necessary by the installation of two additional compressors, thereby providing, normally, at least 18 per cent reserve in the holder after a peak at −30° F. with recovery of holder pressure in less than one hour between peaks at any outdoor temperature. In case of accident to the holder, the proposed gas making capacity exceeds the probable peaks with 3,000 meters installed. Should all but one compressor be out of service in the fifth year, the holder supply can be maintained satisfactorily.

Butane Storage

Liquid butane is delivered in tank cars containing approximately 9,700 gals. and is unloaded, by means of mixed gas pressure, into a horizontal storage tank having a capacity of 21,700 gallons of butane (Fig. 1). Pressure is produced in the tank car by operating one of the compressors as a single acting unit to deliver mixed gas at pressures up to 75 lbs. per sq. in. into the vapor space of the tank car. Provision is made for exhausting residual vapors from the car after the liquid has been removed.

A riveted and welded butane tank designed to specifications of the A.S.M.E. Code for Unfired Pressure Vessels was built in Canada. It has a water capacity of 25,000 gals. and a butane capacity of 21,700 gals. at 60° F. The tank is 10 ft. 0 in. in diameter and 42 ft. 6 in. long.

On account of the general prevalence of ground water in the vicinity of the plant, it was necessary to install a cradle type foundation for the storage tank. The concrete saddles are integral with a large slab run-

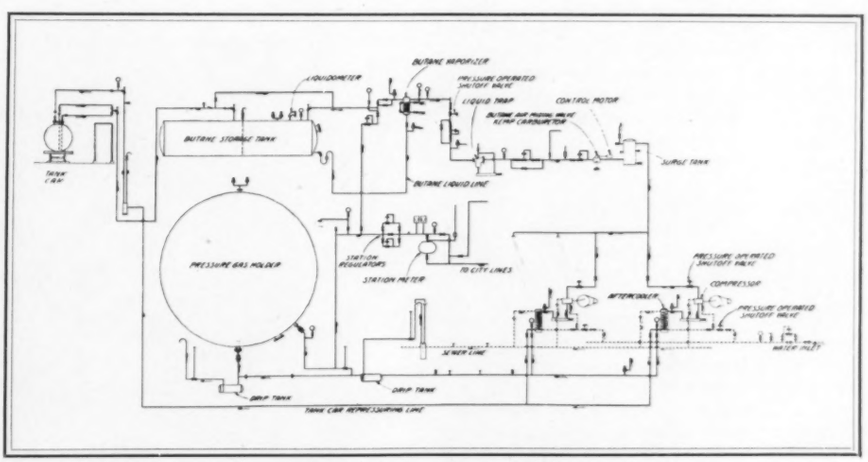


Fig. 6. Flow diagram of Three Rivers butane-air gas plant.

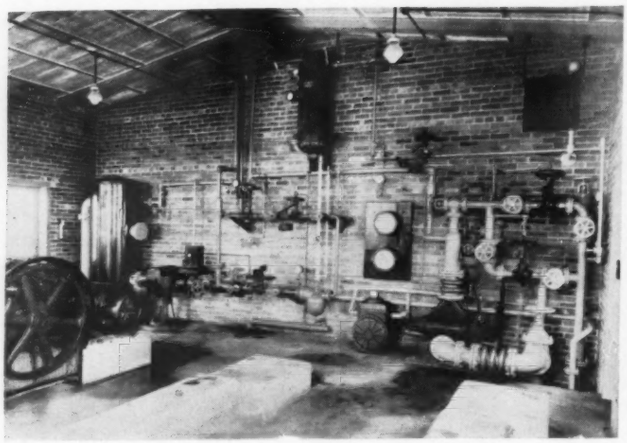


Fig. 7.

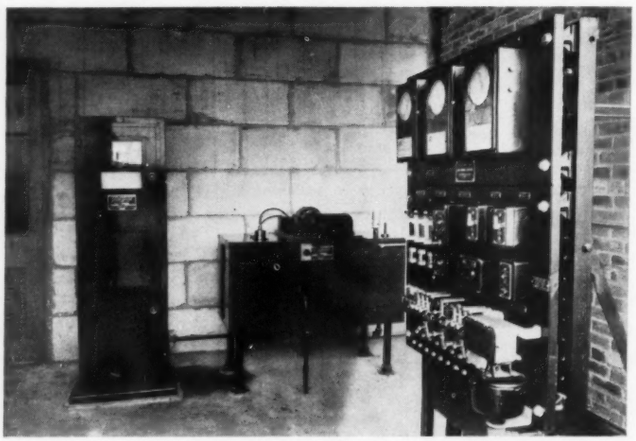


Fig. 8.

ning the entire length of the tank so that heaving of the individual saddles is impossible. Owing to the proximity of the St. Lawrence River, the tank is strapped down to the saddles to prevent it from floating should flood conditions arise at any time. Anchorage to the center saddle is provided to prevent the tank from rolling and creeping. The saddles are provided with grease troughs to permit easy sliding of the tank with expansion and contraction throughout its length.

The butane storage tank is provided with two 4-in. American Car and Foundry Co. safety valves which may be reseated under pressure. By means of a specially designed three-way plug valve, provision is made for the removal of one safety valve at a time in case leakage should occur and repairs be required. Dependence is not placed therefore in the ability of the safety valve seats to remain tight and the possibility of losing quantities of butane due to safety valve seat failures is thereby eliminated. The safety valves may be tested individually for their blow-off pressures without removing them from the storage tank. The three-way plug valve is so designed that it is not possible to close off the lines to both safety valves at once at any intermediate position of the plug. The contents of the tank are gauged by a specially designed "Liquidometer" gauge which reads directly in gallons of butane.

The storage tank is provided with check valves of the velocity type, which close in case of a line breakage and is surrounded by a dyke to hold the contents of the tank in the remote emergency of its rupture. Provision is made for installing a second butane storage tank when required.

Process of Gas Manufacture

The process of gas manufacture may be followed from the flow diagram (Fig. 6) and from the view shown as Fig. 7.

Liquid or gaseous butane is withdrawn from the storage tank and conducted to a vaporizer. Heat, of course, is not supplied when butane vapor is being used. This affords a saving in fuel which is important. Although a gas of varying heating value is used while operating on vapor (due to vapor pressure characteristics of the components in the liquid butane) no complications result due to the accurate control afforded by a Thomas Calorimeter (Fig. 8) which is discussed later.

The butane vaporizer is perhaps novel in that no provision is necessary for control of the flow of liquid butane, or steam, through it. The height of the butane liquid in the vaporizer automatically adjusts itself in accordance with the demand for vapor. The flow of steam—which is provided from the same boiler which heats the plant—also regulates itself. The sudden return to the boiler of slugs of very cold condensate has been prevented by providing a continuous flow of steam from the boiler directly to the heating coil and a direct return of condensate.

The gas supplied to the burners under the boilers is controlled automatically to give a constant steam pressure. The steam inlet and condensate return lines to the coil in the vaporizer are wide open so that steam at full boiler pressure is maintained in the vaporizer coil at all times. The butane liquid line from the butane storage tank to the vaporizer is also wide open at all times. As the demand for vaporized butane increases, the liquid level in the vaporizer rises until a sufficient number of turns of the vaporizer coil are submerged to produce the desired rate of evaporation. The liquid level cannot rise any further because with more coils submerged than are required, the rate of evolution of vapor would be greater than the rate at which the vapor was being withdrawn. This excess evolution of vapor would tend to increase the pressure of the vapor above the liquid in the vaporizer which tends to drive liquid back out of the vaporizer through the liquid line to the storage tank. When the vapor outlet is closed suddenly, as when gas making is stopped, the liquid in the vaporizer is merely driven back into the storage tank by the accumulation of unreleased vapor. The sudden reduction of boiler load is taken care of by the automatic burner controls.

The coil in the vaporizer is designed so that complete submersion is not required under conditions of maximum load, thus preventing liquid butane from passing through the outlet vapor line during normal operation. If the steam pressure in the coil fails and liquid butane should enter the outlet vapor line, it will close the float valve in a liquid trap which in turn results in the complete shutting down of the plant and the actuation of alarms.

There is another interesting feature concerning the use of the vaporizer. When the plant is operating on gaseous butane taken directly from the butane storage tank, butane liquid often condenses in the vapor line due to the fact that there is a lower tempera-

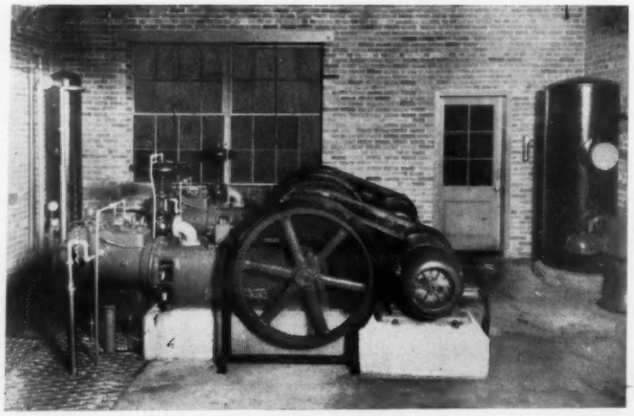


Fig. 9.

ture in the vapor line from the storage tank, under certain atmospheric conditions, than prevails in the storage tank. Although the outdoor line is pitched toward the storage tank, condensation can occur in the lines inside the plant if temperature conditions are proper. In order to prevent this condensate from passing through to the regular butane condensate trap with prompt shutting down of the plant, the vapor is conducted, at storage tank pressure, into the top of the vaporizer which acts as a liquid trap. The vaporizer is located at a height sufficient to overcome any tendency toward flooding and any condensate trapped out in the vaporizer will return to the butane storage tank through the liquid line at the bottom of the vaporizer. This arrangement, utilizing the vaporizer at all times, permits changing from liquid to vapor phase operation simply by supplying steam to the vaporizer and closing the butane vapor line valve.

The plant operates on gaseous butane until the vapor pressure of the butane in the storage tank drops below 10 lbs. pressure. When this occurs, change to liquid phase operation is made and the butane storage tank is repressured automatically by a regulator inside the plant through which gas passes from the high pressure gas holder to the butane storage tank, maintaining a 10-lb. pressure all winter to force the butane liquid into the vaporizer.

The gaseous butane leaving the vaporizer now passes (see flow diagram, Fig. 6) through a diaphragm type shutoff valve controlled by the starting and stopping of the compressors; then through an intermediate pressure regulator set for delivery at approximately 8 lbs. pressure; through a condensate trap provided in case of failure of the supply of the heat to the heat exchanger; and thence through a low pressure regulator set for delivery at 10 in. water pressure to the Kemp Industrial Carburettor.

The condensate trap is a safety feature arranged so that the plant shuts down and an alarm rings if it fills with unvaporized liquid butane. However, shut-down will not take place if small quantities of liquid pass into it, since these are immediately dropped in a short length of pipe which acts temporarily as a vaporizer returning the vapors to the gas line.

The butane vapor at 10-in. water pressure now passes through a regulator which is integral with the Kemp Industrial Carburettor. There its pressure is accurately reduced to 1½ in. water pressure and the gas is then mixed with air in the Kemp Industrial Carburettor to the desired heating value. The mixed gas now passes through a surge tank which eliminates pulsations of the diaphragm and slide valve in the Kemp equipment which would otherwise follow the suction impulses from the reciprocating type compressors, and finally the mixed gas arrives at the inlets to the compressors. A diaphragm type shut-off valve is placed in each compressor inlet line and is opened and closed automatically when that compressor starts and stops.

The gas leaves the compressors at a pressure of 30 lbs. or lower, according to the atmospheric temperature, and after dehydration by the aftercoolers, passes through drip receivers and into the gas holder.

The holder pressure is maintained within selected minimum and maximum limits by Cutler Hammer automatic start and stop pressure controls (Fig. 8).

Finished gas from the holder is withdrawn through one of two parallel station regulators—provided with automatic devices which close the regulators in case of diaphragm failure—where the finished gas pressure is reduced to 1½-2 lbs. At present it is metered at this pressure by an iron case meter which will later be supplanted by a Connersville meter of higher capacity which is now in place. After metering, its pressure and temperature are recorded on 24-hour charts and it passes directly into the distribution system. Provision is available to permit maintenance of pressure in the city lines, even though both station regulators fail, through by-passing either or both regulators and passing gas directly from the holder through a hand-controlled throttling valve to the city lines. The distribution system, most of which was laid several years ago, consists of cast iron pipes in sizes 8-, 6- and 4-in. House connections are 1-in. with house governors set at 10 in. water pressure.

The Kemp Industrial Carburettor which mixes raw butane vapor and air accurately, by volume, is provided with a micrometer adjusting screw which moves its proportioning slide valve to change the air-gas ratio. This micrometer screw is readjusted as required to give the proper mixture of gases by means of a small control motor attached to it. This motor is actuated by a Thomas Calorimeter (Fig. 8) which continually measures and records heating values and corrects them through impulses delivered to the control motor. The direction of rotation of the shaft of this motor is reversible so that the micrometer screw may be turned clockwise or counter-clockwise to raise or lower the heating value as the case may require.

The wide fluctuations in B.t.u. value which are possible, due to fluctuations in air humidity and temperature—when uncorrected volumetric mixing is employed—are eliminated by the Thomas Calorimeter and it is unnecessary to bring both gases to the same temperature before mixing them.

The diaphragm controlling the volume of gas flowing through the Kemp valve will rupture if exposed to back pressures exceeding 12 in. water column. Therefore, electrically controlled, pressure-operated shut-off valves are provided in the compressor intake lines and in the butane vapor line (Figs. 7 and 9) to protect the Kemp diaphragm against idle period leakages and development of back pressure. Also, a relief valve is provided on the surge tank as a final precaution against failure of the compressor shut-off valves.

The balance of the equipment required to produce and control the butane-air mixture was selected for the ultimate plant capacity with the exception of certain regulators the sizes of which were reduced to secure better regulation during the lower load periods in the first three years.

Maintenance of B.t.u. value is of great importance in view of the strict supervision maintained by Dominion authorities over heating value and the fines which they impose for violations of the 450 B.t.u. minimum. Obviously, a gas having a value much higher than the prescribed minimum might be made in the absence of an accurate means of B.t.u. control, but in this case it was desirable to produce a gas as near 450 B.t.u. as possible. It was essential, therefore, that a most accurate and dependable means of B.t.u. control be installed and a continuous record of heating value was also desirable.

The heating value of a butane-air mixture may be measured by its density or by its conductivity to heat. Recorders are available and in use for butane-air gas working on these principles. Unfortunately, however, neither of these methods of measuring B.t.u. value will distinguish the effects of either humidity or temperature changes in the air or temperature changes in the vaporized butane leaving the warm vaporizer with sufficient accuracy to permit operation close to the minimum heating value prescribed by law in Canada. As evidence of the effect of being forced to send out a rich gas, it may be shown that at least one extra tank car of butane a year would be used in this plant after the fourth year if it were necessary to make a 470 B.t.u. gas to meet the Dominion inspector's calorimeter tests.

In order to make gas between 455 and 460 B.t.u., an accuracy of about 1 per cent was needed in the measuring instrument and the Thomas Calorimeter made this close measurement available. It was found practical to assign other duties to this instrument and they will be discussed shortly.

The Kemp Industrial Carburettor is a volumetric device made to deliver definite mixtures of gas and air accurately with any given setting of its valves. It will not, however, recognize humidity or temperature changes or changes in the quality or B.t.u. value of the gases delivered to it and, therefore, may not be depended upon to deliver mixed gas of a constant B.t.u. value. It is necessary, therefore, to supervise the adjustments of its proportioning valve if a mixed gas of constant quality is to be made.

There already being available in the Thomas Calorimeter an accurate measuring device for B.t.u. value and it being possible to make minute adjustments to the Kemp Industrial Carburettor valve through its adjusting screw, arrangements were made to secure supervision of the Kemp valve settings from the Thomas Calorimeter measurements of heating value. This new use of the Thomas Calorimeter was made possible by having it operate the motor attached to the micrometer adjusting screw of the Kemp Industrial Carburettor. Where the Thomas Calorimeter measurement shows an incorrect B.t.u. value, it forces the motor to change the setting of the Kemp valve gradually until the correct B.t.u. value is established. In addition, should gas be produced having too low or too high a heating value, the Thomas Calorimeter shuts the plant down completely and sounds an alarm. Samples for measurement and control of B.t.u. value are taken in the line going to the holder. Although there is an inherent lag in correction of Kemp valve settings, due to the time required for a sample to pass from the compressor discharge line to the calorimeter, it is of no consequence where gas is made at a constant rate and very accurate control of heating value is being secured by means of the

Thomas Calorimeter supervision. Calorimeter tests made by the government inspector on gas in the distribution lines confirm the accuracy of the B.t.u. measurement recorded by the Thomas Calorimeter.

Safety Features

The design of the Three Rivers plant embodies every safety feature which could be incorporated in a plant of this kind. In the physical layout, the plant, gas holder, butane storage tank, unloading platform and main line railroad tracks have been located at least 75 feet distant from each other (See Fig. 1). The butane storage tank and finished gas holder are at least 275 feet from the main line tracks of the Canadian Pacific Railroad and the butane tank is at least 150 feet from a locomotive entering the plant's private siding.

Within the plant the compressor room—where liquid and gaseous raw butane lines are present—is isolated from the balance of the plant by a blank fire wall. The room is provided with down draft ventilation and the air intake to the Kemp valve near the floor removes vapors which may possibly remain in the space. All motors, wiring and lights used throughout the entire plant are of the explosion proof type and switches or arcing devices of any kind have been prohibited in the compressor room. All plant piping was tested carefully for leaks. Extra heavy pipe, valves and fittings were used for all gas lines where the size was 3 in. or smaller to provide desirable strength.

Arrangements are provided to shut the plant down and sound an alarm in case of low voltage or power failure, water failure, steam boiler failure, failure in the butane supply and in case of either a high or low B.t.u. value. Emergency features are so arranged that the source of trouble may be located very rapidly when an alarm sounds.

In the layout of the gas making equipment, provision is made for contingencies arising from improper operation or from high temperatures. Safety valves are installed at every point where either high gas pressures or hydrostatic pressures might result from any cause. Regulator diaphragms are protected against rupturing back pressures and every precaution taken to assure continuous, automatic functioning of the entire plant.

Automatic Control

The automatic controls which have been included in this plant's design provide for continuous supervised operation of each of the functions without human control. Barring failures in power, water or butane, no operating attention is required except for the periodic oiling of compressors, the reading of meters and gauges and changing of temperature and pressure recorder charts.

The electrical control equipment was supplied by Cutler-Hammer, Inc., and is shown partially in Fig. 8. Provision has been made so that all functions which are automatically controlled may be operated manually when desirable. Pressure in the storage holder starts and stops the compressor motors, and, by means of relays, compressor unloaders and various solenoid valves controlling pressure operated valves open or close simultaneously according to their functions. In order to equalize wear between the two compressors, a transfer switch is provided which permits having either compressor lead in the making of gas. The starting switches on the compressors are set so that the second compressor will pick up the load in case the first compressor is unable to maintain the holder pressure. Water pressure and butane or mixed gas pressures are all automatically controlled by means of pressure regulators, and, during cold weather, the pressure on the butane storage tank is automatically maintained. Continuous automatic control of heating value has been previously discussed, as well as the provisions for automatic shut-down of the plant in case of abnormal developments. In brief, it may be said that the only manual operation required at the Three Rivers plant is in the unloading of tank cars of butane. In other respects, the plant will function for many days without the attention of an operator.

The plant building is constructed of brick and is fireproof throughout. The building, which is 54 x 25 feet, houses the company's meter and service departments, the government's meter testing station and the necessary gas making and control apparatus. Plant heating is provided by a gas-fired steam boiler supplying unit type heaters equipped with explosion proof motors. Mercoid temperature controls maintain temperatures of 50° F. in the compressor room and 70° F. in the balance of the building.

The plant was completed by the Eastern Construction Co., Montreal, under the supervision of P. C. King, present manager for the City Gas & Electric Corp., Ltd., within a period of 90 days, and initial operation of the plant was made on May 14, 1932. The Hortonsphere had not been completed when the plant started but an empty tank car was used as a holder and served satisfactorily, since only a limited number of customers were receiving service in the first month.

The plant has now been in operation for over one year and has passed through a severe temperature condition during the past winter. In spite of the severity of this condition, there has been no trouble with freezing of water or condensation of butane at any point either at the plant or in the distribution system.

Although high propane content gases are somewhat better suited to low temperature weather conditions, the less desirable B.t.u. content and unfavorable volumetric comparison makes the commercial grade of butane a desirable hydrocarbon for air carburetted gas wherever it is possible to employ it. Experience during this full year of operation at Three Rivers has confirmed the practicability of employing butane-air gas in a climate which ordinarily dictates the use of a high propane fuel. It has demonstrated the feasibility of an air mixed gas being employed without suffering condensation or freezing troubles at very low atmospheric temperatures when the distribution mains are not buried below the frost line. The satisfactory performance at Three Rivers makes an expansion of the use of the relatively high-boiling butane practical for cities and towns everywhere regardless of their weather conditions.

With the return of normal business stability and normal employment, the butane-air gas plant at Three Rivers should demonstrate the practicability of serving a city having as many as 35,000 in population with a gas other than that made by the coal or water gas processes. This and similar plants in cities of lesser population in the United States should lend momentum to a wide development of the use of butane-air gas plants in view of their automatic operation, high quality of gas produced, reasonable gas costs, lower plant investment charges and their simplicity of operation and maintenance.

To the successful achievements of the many butane-air gas plants operating at present, must now be added that of Three Rivers, which has operated successfully where the city mains cool far below the freezing point of water and where the atmospheric temperature has dropped to −20° F.

Butane as Stand-by for Mixed Gas

(Continued from Page 23)

upper pipe the butane line. Normally the wheel operated plug valve in the butane line is closed, with manufactured gas and natural gas flowing to the proportioning regulator in the left foreground of Fig. 4. In case of a failure of natural gas flow the manufactured gas is automatically shut off. To restore service it is necessary for the operator to pump natural gas from low pressure storage, until (a) the manufactured gas has been carburetted to the proper heating value, (b) the regulator differentials have been manually adjusted to the proper value, and (c) the butane vaporizer has been heated to steam temperature. After these operations have been performed it is necessary only to cease pumping natural gas and open the 6-inch wheel operated plug valve in the butane line, and the emergency butane enriched carburetted water gas will be automatically mixed and sent through the high pressure spherical holder into the distribution mains.

Control of Eastern Shore Gas Co. Properties Passes

Properties of the Eastern Shore Gas Co., headquartered at Pocomoke City, Md., have been purchased by Wm. H. Wulff and L. D. Pierson from Robert Lewis and P. J. Minck. The company owns and operates a butane plant and system in Ocean City, Md., with an 8-inch pipe line out of Ocean City to Berlin, Md., where butane is served through distribution mains. Another property is the propane plant at Snow Hill, Md., from which a bottled gas business has been developed in rural communities in Maryland and Virginia and the southern section of Delaware. A central plant and distribution system for propane service is also maintained at Chincoteague, Va., and a plant in Pocomoke City, Md., where headquarters are maintained.

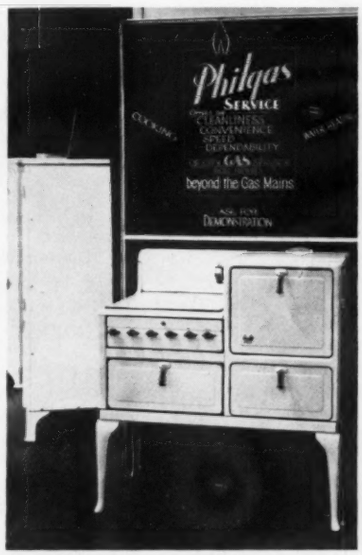
Braun Is Paynesville Distributor

J. E. Braun has been named distributor of "Pyrofax," in Paynesville, Minn. Pyrofax is a bottled gas manufactured by Carbide & Carbon Chemicals Corp., New York, N. Y.

Lowell Gas Light Co. Cooperating in Philgas Service

HOW one gas utility is cooperating with bottled gas interests in its territory is shown by the active assistance Lowell Gas Light Co., Lowell, Mass., is giving Philgas Co.'s sales campaign in the South Sudbury district.

According to W. Z. Friend, manager of the Philgas sales in that district, the company has received many prospects from the Lowell Gas Light Co., more than half of whom were sold, thus developing a preference for the use



of gas among suburban home owners, who, if bottled gas service were not available, might turn to other methods of cooking.

The gas utility maintains a permanent display featuring Philgas service on its sales floor, which is shown in the accompanying illustration, and has found it helpful to be able to recommend and demonstrate bottled gas service to those in the company's franchise area who desire gas service, but whose location makes it impossible for the utility to serve them at the present time.

New Rate for Southern California Gas Co. Consumers

Terminating litigation involving rates of the Southern California Gas Co., A. B. Macbeth, president of the company, on June 1 voluntarily reduced the company's annual revenue by $1,000,000, the reduction being accepted by the California Railroad Commission. At the same time it was agreed to make refunds to consumers which will total about $250,000.

A schedule of rates is now being worked out to apportion the reduction among the company's customers.

O'Lenic to Manage Rome District

Alabama Utilities Co. announces that S. V. O'Lenic has been appointed manager of the Rome District, Rome, Ga. Mr. O'Lenic was manager for the Selma office of the company.

Illustrating a typical Butane Tank and Pump Truck Mounted Installation.

...See the

Southwest Welding Co. Butane Tank and Truck Units Before You Buy...

Southwest Welding Co.'s Engineers are specialists in Butane Tank design. Tanks are built from 100 to 10,000 gallon capacity. They are of electric weld construction and are fabricated to conform to the A.S.M.E. Class I Welding Code as well as to the California Unfired Pressure Vessel Code, in both stationary and truck body installations.

Southwest Welding and Manufacturing Co., Inc.

Alhambra • California

TWENTY-FIVE YEARS OF WELDING EXPERIENCE

Further Research on Liquefied Petroleum Gas Scheduled for 1933-1934

IN his report as chairman of the Liquefied Petroleum Gas Committee of the Natural Gasoline Association, given before the annual meeting of the Association, held in Tulsa, Okla., May 15-17, T. W. Legatski made the following remarks regarding the tentative specifications for liquefied petroleum gases adopted in 1932, and other projects now before the 1933 committee:

"The specifications seem to have stood the test of commercial practice fairly well. However, more experience is necessary before final judgment can be reached as to their correctness. In the meantime, due consideration will necessarily have to be given to the corresponding refinery light fractions which are making their appearance as competitive products.

"It will be one of the duties of the incoming 1933 committee to study the characteristics of these competitive products and also the existing tentative specifications to determine whether further revisions are necessary. This work should also include a study of the various test procedures now in vogue. Particular attention is called to the necessity for a standard method of determining sulphur content and the corrosiveness of such products. Considerable work along these lines has already been done in the individual laboratories of the member companies.

"Your committee has continued to direct its efforts to the as yet unsolved problem of locating a suitable warning agent for these gases. Several months ago, an arrangement was consummated whereby the U. S. Bureau of Mines and the Mellon Institute of Industrial Research agreed to undertake this study in a cooperative way. The project is being sponsored by a number of the larger manufacturers. Although the problem has always been considered an important one, it has proved to be far from a simple one. By combining our efforts and pooling our resources in the present Bureau of Mines investigation, it is hoped a satisfactory answer to this important problem will be forthcoming some time during the ensuing year."

Cedar Falls, Iowa, Planning Municipal Gas Plant

The Cedar Falls, Iowa, city council has voted to ask the state budget director's permission to allocate $50,000 out of the municipal electric light plant's surplus funds for the purpose of constructing a gas plant and system. The plant will cost in the neighborhood of $85,000, and will be completed before October if the permit is secured. City Engineer C. H. Streeter is preparing the plans.

Prepayment Meters: Aid to Load Building

By W. D. DICKEY
*Manager, Pacific Meter Works**

THERE are some indications that English history may repeat itself in this country history may repeat itself in this may find the use of prepayment meters a genuine aid to load building. Not only is this possibility on the horizon, but the prepayment meter has a definite place in helping the company to collect delinquent bills and keep impoverished customers on the lines.

W. D. Dickey

Let us look first at the constructive side of the picture—the prepayment meter as an aid to load building. The number of prepayment meters used in England and the reasons therefore are, to the uninitiated, startling. Table No. 1 gives a typical group of gas companies serving large and small areas, with the total number of customers and the number of prepayment meters serving these customers.

The significance of these large percentages of prepayment meters to total customers is primarily found in the rental policy of gas companies on various types of gas appliances to build and keep their load. This is accomplished as follows: The prepayment rate wheels are so set that the customer pays for 1000 cubic feet of gas at the current price but obtains actually only 800 cubic feet. The difference represents the rental paid, for example, on a radiant heater, range, water heater and incinerator. The appliances are owned, of course, by the company. The flexibility of this policy is evident and great. In this regard it can be compared with the practice of telephone companies in this country with their great number of coin pay stations through which they obtain revenues which would go to other forms of communication, such as the telegraph, if they depended entirely on monthly billing installations.

I shall not dwell longer on the rental of appliances as this important subject has already been amply and well treated in the discussion led by Mr. Babcock.† It is mentioned here simply to show how the use of prepayment meters in Great Britain has been a tremendous aid to this type of load building.

Another useful service which can be performed by the prepay meter is to assist in holding present customers and collecting back bills. Its use for this purpose has been pioneered in New England, though to date other parts of this country have been slow in following suit. An example of the marked tendency toward increased use is shown in the experience of one New England gas meter factory with sales of prepayment meters for the past four years as follows:

1929	2286	1931	3492
1930	2213	1932	6858

The manager of this factory anticipates that its 1933 prepayment meter sales will approximately double the 1932 sales. Up to three years ago there were three New England companies purchasing prepayment meters; today there are 27. This has been caused solely by economic conditions, in spite of the fact that the popularity of the prepayment meter is no greater today than it was 10 years ago. Many New England companies are opposed to them, although some companies that took this attitude several months ago have recently been forced to change and are now using them. These meters are mostly set at a higher rate than that current in the community for gas and in some cases they are used for collecting appliance accounts. I quote from a letter from the above-mentioned manufacturer:

"You will be interested in a conversation I had with one of our customers just recently. This company, previous to 1920, had a large number of prepayment meters. These were all changed to regulars and since that time they have been very much opposed to the use of prepayment meters. Now they believe that in order to hold some of the business they are losing, they have got to adopt the prepayment meter.

"One of our customers bought 3,000 prepayment meters from us last year; also, had prepayment attachments placed on meters that were originally sent out as prepayments. Without the use of this type of meter they believe that they would have lost most of these customers. Prepayment meters that are set at a higher rate to collect back bills, are, in many cases, allowed to continue with the higher rate wheels and the gas company returns the money, over the amount needed to pay the current gas bill, to the consumer. I heard of a case yesterday where there was a credit of six dollars' worth of coke.

"Most of our customers do not believe in the prepayment meter but feel that under the present economic conditions they can use a certain number to good advantage. I would not advocate the use of prepayment meters to be set out-of-doors and in places where the possibility of robbing the meter would be easy. This is one feature of the prepayment meter that put it out of business."

The New England experience has been duplicated in isolated cases in other parts of the East and Middle West. The use of prepays on the Pacific Coast has been nominal to date and confined principally to auto camps and cheap lodging houses as sub-meters installed by the owners. Especially in California a large percentage of meters are set out of doors, which fact renders their use difficult. Also in California, until very recently, the advent of natural gas has stimulated sales so that normal types of gas company selling effort have sufficed.

It is becoming increasingly evident, however, that the bonanza days of nominal sales resistance are about over (In fact, I think our friends here in the Northwest will agree that the competition of other forms of fuel have created ample sales resistance) and every aid to load building which can be found must be given serious consideration if the industry is to prosper to its fullest potential extent in the future. Although general business conditions are apparently improving there still are, and always will be, many people who will find it far easier to put a quarter in a slot every few days than to pay a monthly gas bill involving dollars.

While this type of gas service is not the most desirable, it does offer the possibility of obtaining business which would otherwise be lost, and it will bear serious investigation as an aid to load building.

TABLE NO. 1

Name of Customer	*Total Customers*	*Prepay Meters*	
London Gas Light and Coke Co.	1,207,520	664,331	55%
Hornsey	22,294	7,812	31%
Lea Bridge District	34,812	20,578	59%
North Middlesex	18,303	3,651	20%
South Metropolitan	413,957	311,044	77%
South Suburban	105,460	46,589	44%
Tottenham District	98,078	66,322	67%
Leeds	131,055	72,318	55%
Manchester Corp.	209,230	90,189	43%
Liverpool Gas Co.	197,741	108,851	55%
	2,438,450	1,391,685	54%

* Presented at Northwest Conference of Pacific Coast Gas Association, Seattle, Wash., June 22-23, 1933.

† Mr. Babcock's discussion will appear in an early issue of *Western Gas*.

Construction and Operation of Positive Gas Meters

By W. G. Cox

*Los Angeles Gas and Electric Corporation**

THE first meter was designed and built in 1815, by Samuel Clegg, an Englishman, but it was not until 1844 that a decided change in meters was inaugurated with the advent of a new type dry meter. Since the conception and the practical application of this revolutionary idea in volumetric measurement, industry has advanced to hitherto unbelievable heights, the mechanical trend has become highly specialized, but the principle of the two-diaphragm, slide-valve meter has remained unchanged. This fact alone is a mute testimony as to the practicality of the original idea. True, there have been improvements in design, the raw materials have been perfected, the finished product standardized, but fundamentally all meters operate along the first plan; namely, "that of alternately filling and emptying chambers which have movable walls, and the movement of the walls being so regulated that the cubical displacement of successive cycles is the same."

W. G. Cox

A brief general description of a tin meter and an iron meter is offered below, since these two meters embody the fundamental principle which operates all common displacement gas meters.

The tin meter (Fig. 1) proper is divided internally into three main compartments by a horizontal valve table and a vertical partition. The lower compartments are subdivided by leather diaphragms forming four measuring parts. Each of these diaphragms is supported by a flag attached to a vertical rod which extends to the horizontal compartment above. The vertical rods are attached to a tangent arm connected to a vertical crank which passes through the crank stuffing box into the valve-box—a gas tight box containing the valves. These valves control the passage of gas into and out of the lower compartments. Each valve seat is composed of three ports; the middle port of each seat connects with the outlet channel, the ports farthest from the center of the meter connect with the case compartments, and the remaining ports connect with the diaphragm compartments.

A gear mounted on the vertical crank below the tangent drives the index which records the amount of gas used.

The iron case meter (Fig. 2) is enclosed by four distinct castings, namely, the main part or body, the front case, the back case, and the top. Internally, it is divided into two major compartments by a horizontal valve table. The lower compartment is subdivided into three compartments by the front and back diaphragms. These diaphragms and the diaphragm discs are supported by carrier wires, and by a connecting link which is clamped on the lower extremity of the main movement by a horseshoe cotter clip. The action of these diaphragms causes the crank in the main movement to rotate, and this motion is transmitted to the valve above, which rides on a tangent clamped to the upper end of the crank. A projecting nipple on the upper surface of the valve drives a flag arm which in turn drives the index and records the amount of gas used.

After the meter has been carefully assembled, it is tested and adjusted until it is absolutely correct. The tests to which these meters are subjected before leaving the shop are of such accuracy as to make it improbable that the meter will vary far from the original test. Tests are made under two distinct conditions. One test is called the open-flow test, the other, the check test. The open-flow test is made without any inhibitory action at the outlet, while the check test is made with a cap on the outlet allowing only 50 cubic feet of air per hour to pass through the meter, when under a pressure of 2 inches. When these two tests are equalized, the consumer is assured of accurate service at both high and low speeds.

The Meter in Operation

To illustrate the theory of the measurement of a cubic volume of gas by the meter, we might draw a simple word picture corresponding to the function of the meter in operation. Imagine an ordinary water basin, with a mark indicating exactly one quart volume, draining into a large tank. When the water has reached the "quart" mark, the faucet is shut off, the stopper pulled, and the water allowed to drain into the tank. When the basin is empty, the stopper is replaced and the operation repeated. A count of the number of quarts drained into the tank will indicate the amount of water drawn from the faucet. This is a common example, but to get accurate results four conditions must be fulfilled:

1. The water must be shut off at exactly the quart mark.
2. While the basin is being filled, no water must escape from the basin into the drain pipe.
3. After the quart mark has been reached, the faucet must be firmly shut off before the basin starts to empty.
4. An accurate count must be kept of the number of quarts emptied into the tank.

The tin meter commonly used has four of these measures working simultaneously, some emptying, others filling, but always fulfilling the above conditions. The capacity of one of these measures is simply the amount of gas the diaphragm will displace from the limit of its emptying stroke to the limit of its filling stroke. In other words, if the front diaphragm is theoretically empty, the front case compartment will be full; the back diaphragm compartment will contain a maximum of gas, the back case a minimum. Gas cannot enter or escape from the front compartments as both ports are closed, but inlet gas will enter the back diaphragm causing it to start and continue on its filling stroke until the limit of that stroke is reached. The action of this diaphragm will force the gas out of the back case and into the outlet channel. The amount of gas displaced by the back diaphragm from the beginning to the

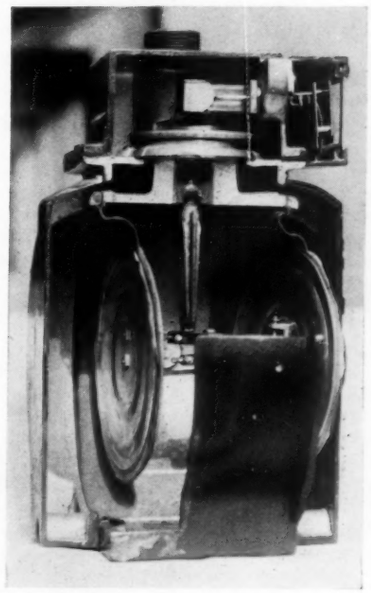


Fig. 2.

* Presented before the Southern California Meter Association, April 27, 1933.

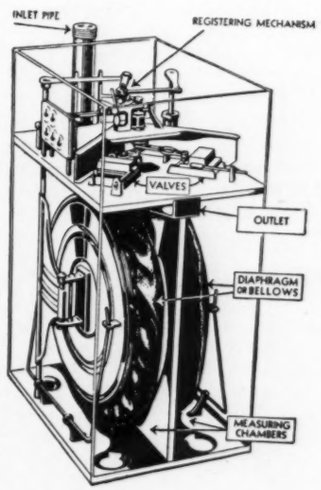


Fig. 1.

1. "Displacement Meters," American Meter Co.

end of its filling stroke indicates the capacity of the diaphragm compartments. The accompanying diagram will enable the reader to more clearly visualize this description.

The iron meter works along the same general principle, with the exception that there are not so many measuring compartments. The ports which control the passage of gas are in closer proximity and are opened and closed by the oscillating motion of the valve in comparison to the slide valve of the tin meter. As the valve closes one port, it opens another, so the ports must be equalized in order to secure satisfactory service.

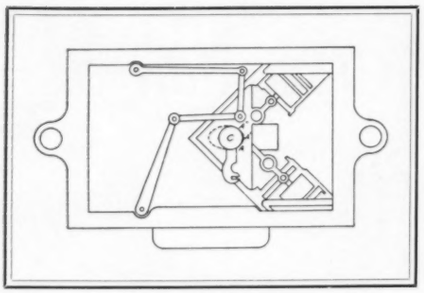


Fig. 3.

What Causes Inaccuracy?

When a meter is put in the service of a corporation, it should have been so carefully assembled and be so mechanically perfect that after a period of years, a test of that meter would coincide with the original tests. Theoretically this should be true, but actually a slightly different story is told. There is scarcely a meter brought into the shop that has retained its original test. A meter sent out O. K. on both open flow and check tests after three or four years of service may show a 3 per cent spread between the open and check tests.

We cannot conclusively say that the change of a test is caused by this defect or that reaction, because these tests deviate from the original due to a combination of closely related conditions; however, we can explain some of the more prominent causes.

If any single factor could be established as being the most important in meter assembling and repairing, it would be the diaphragms. The diaphragms, and their condition before entering the meter, are of the highest importance if meter accuracy is to be obtained. If two diaphragms of unequal weight and viscosity are placed in a meter, absolutely accurate registration over a period of years cannot be expected; that is, the tests will not stay in the same relative positions as when the meter left the shop. The open test and the check test will split in direct proportion as the diaphragms differ in weight, moisture, viscosity, and years of service. The explanation is comparatively simple.

It is practically impossible to get two diaphragms perfectly matched, as all different sections of a hide are not of uniform thickness—consequently of uniform weight. As a diaphragm is not uniform throughout, the difficulty of securing two perfectly matched diaphragms is apparent. When the diaphragms are put in the meter, and the meter is assembled, it is adjusted to run with absolute accuracy. With a meter working perfectly these diaphragms displace let us say 172 cubic inches in one stroke. Due to a series of complicated forces acting on the diaphragms, they undergo a slight change as their service period increases.

The diaphragms are of unequal viscosity, they do not react in exactly the same manner to a variation in temperature and moisture, they may not have put in the same number of years of service and, as all these factors work together on the unequal weights of the diaphragms, there is a gradual but decided change in the tests of the meter.

When the meter is originally tested, these conditions have not had the time or the opportunity to assert themselves, and any difference in the weight of the diaphragms is offset by a mechanical shifting of the tangent. As the meter is operated in service, as the saturation of the gas begins working on the diaphragms, as the rise and fall in temperature affects the meter, the diaphragms contract or expand as the case may be. What happens? Supposing, for instance, that the gas passing through the meter is very moist and the meter is placed in a damp spot. Naturally the diaphragms will expand and stretch, and, instead of reaching the limit of the stroke with a displacement 172 cubic inches, that limit will not be reached until possibly 174 cubic inches have been displaced. This in turn will cause the meter to run slow because the diaphragms will allow more gas to pass through the meter with each successive stroke. As these diaphragms are of unequal weight, one may displace 174 cubic inches per stroke while the other will displace only 173 cubic inches thereby causing the open flow test and the check test to split. A fast meter will be the result if the gas passing through the meter is a dry gas, or if the meter is placed in an open spot so that the sun will cause the diaphragms to contract.

Another item that would probably cause the open and check test to separate is the structure and composition of the diaphragms themselves. In a diaphragm are little minute folds that do not get a chance to open up when the check test is conducted, but which do unfold when the meter is on the open. With the check on the outlet there is a backward pressure due to the fact that the only opening at the outlet is a $\frac{3}{16}$-inch hole allowing 50 cubic feet of gas per hour under 2 inches pressure to pass through the meter; therefore, the backward pressure will so offset the pressure of the gas that the folds in the diaphragms will not expand. When the meter is on the open and 2 inches pressure exerted on the diaphragms, these folds will open out and form a greater displacing surface; consequently, the open test will tend to run slower than the check test.

Lost Motion

Lost motion plays a small but important part in the changing of the speed and relative positions of the tests. As an example, take the crank of the tin meter (Fig. 3-c). When the crank is revolving in a perfect circle, let us take any point A on the circumference of the crank. If it were possible to stop the meter at the precise moment when the diaphragm had reached the limit of its filling stroke, the point A would, let us say, stop in the position of A′. If lost motion were encountered in this case—if the crank were revolving in an elliptical orbit as outlined by the dotted lines—and the meter were stopped again at the limit of the diaphragm's filling stroke, the point A would naturally have farther to travel than in the previous case and would stop in the position of A″. In order to bring A up to the position of A′ (when the crank was revolving in a circle), it is necessary to start the diaphragm on its backward stroke; therefore, when lost motion exists, more gas is used. The logical conclusion is that lost motion tends to make a slow meter.

As in the case of folds in the diaphragm, the backward pressure exerted from the outlet when the check is on plays a significant part in the respective positions of the open and check tests. With the check on the outlet, the meter is operating at low speed, and the crank, travelling so slowly, revolves in and out of every depression and projection on the face of the elliptical orbit, whereas operating on the open and at a much higher speed, the crank would tend to hit only the high spots. If these uneven surfaces, be magnified, it is apparent that, over the same period of displacement, the point A on the crank will travel farther on the open than it will on the check test; therefore, more gas will be displaced when the meter is operating at high speed. Conclusion: Lost motion tends to make a slow meter and at high speed more gas will be displaced per cubic registration than at low speed.

This article was not written with the idea of offering corrective suggestions, but rather to stimulate interest among the men working on gas meters in the fundamentals of meter operation. A fuller knowledge of these principles should lead to improvement in the art of correct meter repairing, and help to place a more accurate meter at the disposal of the gas industry.

To Measure All Turner Valley Open Flow for Alberta Government

Involving an outlay of approximately $18,000, meters to determine the various gas flows are being installed by Turner Valley producing companies.

Companies are required to install meters as a consequence of the report made to the Provincial Government in Alberta by the Turner Valley Gas Conservation Board. The government will hereafter keep accurate reports of the gas being produced by each company. Cost of installing each meter, plus the original purchase price, is approximately $350.

Catalog Describing Westcott Orifice Meters for Distribution

Catalog EG-2, dealing with Westcott Orifice Meters has been brought from the press by the Metric Metal Works of the American Meter Co. The catalog discusses and gives specifications for orifice meters for gas, oil, air, and steam fluids with cross-sectional views, diagrams and photographs. The booklet is attractively prepared in two colors, and copies may be secured by writing to the company at Erie, Pa.

7th Year Inaugurated by S.C.M.A. Elections

CULMINATING another successful year of Southern California Meter Association activity, President L. P. W. DesBrisay on June 22 turned the gavel of office to C. B. Heartwell of the Standard Gasoline Co., who will lead the S.C.M.A. program for its seventh year.

C. B. Heartwell

The June 22 meeting convened at Hotel Lafayette, Long Beach, Calif., dinner being followed by an unusually clever magic act staged by Frank Allen & Co., with the assistance of Gordon Greene and Past President P. W. Hill.

Following the entertainment a highly interesting program feature was introduced by H. E. Thompson, combustion engineer of the Los Angeles Gas and Electric Corp. For the past several years Mr. Thompson has been developing a series of circular alignment charts for computing orifice meter records. Several of the charts were displayed, and the method of superimposing them over standard charts to secure records reading in cubic feet of gas was demonstrated. A paper which will appear in an early issue of *Western Gas* described the circular alignment charts and their use. This was read by Wm. C. Poe, and further discussion was given by C. E. Crabill. Both Mr. Poe and Mr. Crabill are of the Los Angeles Gas and Electric Corp. Seal Beach plant staff and are familiar with routine use of the charts.

B. G. Williams, B. M. Laulhere and P. W. Hill, all former presidents of the S.C.M.A., brought in the nominating committee's recommendations for officers to serve during the 1933-1934 term, the report being read by Mr. Williams as chairman. Following are the new officers and committee chairmen, who were unanimously elected:

President: C. B. Heartwell, Standard Gasoline Co.

Vice-President: Edgar Wilde, Southern Counties Gas Co.

Secretary: G. S. Duncan, General Petroleum Corp.

Treasurer: R. F. Angell, Union Oil Co.

Committee Chairmen:

Program: F. E. Bradley. Chanslor-Canfield Midway Oil Co.

Membership: J. A. Swindle, General Petroleum Corp.

Entertainment: Ralph Cook, Southern California Gas Co.

Standards: T. K. M. Smith, Industrial Fuel Supply Co.

By-Laws: Gordon Greene, Associated Oil Co.

Publications: George H. Finley, Western Gas.

Following the election the new officers were introduced and President-elect Heartwell made a few brief remarks of appreciation on behalf of the new board.

The meeting concluded with a motion of appreciation to out-going President Des Brisay and his board, for their effective administration of Association enterprizes during the past year.

Another year of S.C.M.A. golf began with the tournament of May 27. Walter Seymore of the Non-Corrosive Products Co., Ltd., as winner of the event, is the first custodian of the new S.C.M.A.-*Western Gas* Goodfellowship Trophy, which was presented to him at the June 22 meeting, along with one of the small golf figures to be awarded each month to the tournament winner for permanent possession. A. E. DeBurn announced the June 24 tournament, this being the last of many S.C.M.A. golf affairs staged under his direction. Mr. DeBurn has been in charge of S.C.M.A. golf for the past three years, during which the tournaments have grown increasingly popular.

Texas Decision Supports Right to Sell

THE dissolution of an injunction granted to the attorney general of Texas restraining the San Antonio Public Service Co. from selling gas and electric appliances by the Third Court of Civil Appeals of Texas on June 7 marked an important development in the status of utility merchandising in that state.

Three days later the Supreme Court of Kansas handed down a similar decision upholding the right of public utilities in Kansas to buy and sell gas and electric appliances incident to their business. (See page 8).

In both cases the courts, in reversing lower courts, held that sale of such appliances is within the implied, or incidental, powers of the company. In the Texas case the appeals court, however, held that the company did not have power to sell appliances to anyone but its own electric and gas customers.

The Texas suit was brought by Attorney General James V. Allred to enjoin the San Antonio Public Service Co. and was regarded by gas company officials over the entire Southwest as a test case with far-reaching possibilities.

After the filing of the suit, the company ceased selling gas and electric appliances in San Antonio, giving as its reason that the local merchants were rendering sufficient service to its gas and electric customers with respect to appliances. However, the company continued to use space in its main office for demonstrating and displaying for various merchants all kinds of gas and electric appliances, and paid salesmen to induce its customers to purchase such appliances from the merchants selling them.

The trial court also found that it is not the universal custom in Texas for utility companies to sell appliances; this finding, the Court of Civil Appeals said, is not material.

"The material issue is whether the sale of such appliances is the usual method employed by utilities in the accomplishment of their main business of manufacturing and selling gas and electricity to the public," the opinion stated. "The evidence on this issue shows that every privately owned electric company in Texas sells and for many years has sold electric appliances; that three of the 10 municipally owned electric systems inquired about sell electric appliances or have sold them; that of the 34 gas companies operating in Texas, all except four sell gas appliances, and the four not selling them are related companies under one management, and one of these maintains a display of appliances at its main office."

The opinion further said the evidence showed the sale of gas and electric appliances is the usual means employed by utilities in the extension of their service and in accomplishing their main business of manufacturing and selling gas and electricity.

Direct Mail Features Sale-Rental Plan

MEMPHIS Power & Light Co., Memphis, Tenn., has prepared a series of direct mail folders which are being mailed out to a selected list of prospective customers, according to Paul Renshaw, advertising manager. The list comprises about 4,500 names gathered during a general survey of the city some time ago when the company made a survey of the type of heating appliances used in Memphis homes. The list has since been brought up to date by elimination of those who have bought gas heating equipment since it was originally compiled.

The folders are being sent out one at a time a week apart to about 100 or 150 names per day, taking about 30 to 45 days in which to make completed mailings to each of the 4,500 prospects.

The chief message of the folders is "Now you can buy a standard gas heating installation at $2.00 per month," and features a plan for installing gas burners on a five-year sales-rental plan.

The folders are attractively and smartly composed, both as to typography and copy, each being different from the others in composition and style. Each features the comfort, convenience and economy of a gas installation. The first contains a letter signed by the company's commercial manager, J. J. Brennan, together with the outline of the new buying plan; the second gives further detail, and the third features the slogan graphically illustrated, "Two Dollars Per Month Opens the Door of Heating Comfort."

Fluor Equipment Being Installed at Ventura Compressor Plant

Southern California Gas Co. of Los Angeles is replacing its cooling tower at the Ventura compressor plant with a Fluor installation. Approximately 50,000,000 cubic feet of gas per day will be dehydrated at the Ventura plant, using Fluor equipment.

Give Heating Customers the Facts

(Continued from Page 12)

winter of 1929-30 was generally regarded as the coldest winter for several seasons for the reason that the thermometer had gone to 14° below zero in January. However, the effect of this cold weather upon what people thought of gas heating costs did not fully materialize until the following winter.

The heating bills for the winter 1930-31 were not unusual but as the season progressed and a severe cold spell corresponding to the sub-zero days of 1929-30 failed to materialize, the feeling developed that the heating bills should really be lower than they actually were. On a Degree Day basis the cost of heating was running as it should run, but customers were not considering the matter on any scientific or accurate basis.

A two-page, closely typewritten letter containing a table of Degree Day statistics sounds like a lot to send out broadcast to several hundred heating customers. We really wondered how the customer could be expected to go through it all, but we could not tell our story briefly.

It produced remarkable results. Most of the customers apparently understood the explanation and in those cases where the customer did not understand, the letter afforded a common ground for coming to an understanding when the occasion arose.

The following season, the season of 1931-1932, was even more unusual in that the weather actually was a great deal warmer than normal. However, March turned out to be the coldest March in years with a result that because of the unseasonableness of the cold weather there again was some apprehension concerning the amount of fuel required.

Again a letter explaining Degree Days proved valuable and at the conclusion of the season it was decided that arrangements should be made to give our customers this Degree Day information monthly, perhaps with their monthly bills so that they might know at all times just how their fuel consumption compared with the fuel requirement.

Beginning in the fall of 1932 this Degree Day information was transmitted to customers monthly with their bill regardless of whether or not the weather conditions were such that it was necessary.

Inasmuch as the company's billing periods did not coincide with calendar months, it was necessary to make a special arrangement so that this Degree Day data could be kept up to date daily. Each working day one district is billed and, from Degree Day data kept readily available, the billing department places on each bill the Degree Day Deficiency for the period covered by the billing period. In addition a letter of explanation was sent to all customers and tables of degree days for past years were carried in a special space on the gas bills.

Just how this information was used by one customer is shown by a bit of calculation which was sent in with a check in payment of a heating bill. The calculation was:

Gas used ..... 33,000 cubic feet
Cooking and water heating (estimated) ..... 4,000 cubic feet
Used for heating ..... 29,000 cubic feet

Degree Days 650

$$\text{Cubic feet per degree day } \frac{29{,}000}{650} = 45$$

This customer had determined that for his house 45 cubic feet of gas was required for each Degree Day. The figure will not be exactly the same each month but will not vary greatly and will give, for all practical purposes, a guide so that the amount of gas used can be checked against the Degree Day Deficiency. Investigation disclosed that for the preceding month of 914 Degree Days 40 cubic feet of gas was required by this customer for each Degree Day.

To this customer the guess work has been taken out of heating. No longer does he watch a vanishing coal pile and wonder how much fuel is being used. With gas he has not only eliminated the dirt and work of old fashioned heating—he has placed his heating on a "business basis."

Explaining Variations to Customers

Wind, rain, and other weather conditions have some effect on fuel requirements, but the effect is usually of minor importance as compared with temperature. However in spring and fall there are some conditions which frequently cause fuel consumption to be somewhat heavier than the Degree Day Deficiency figures indicate to be necessary. During mild weather there may be some heating required in the morning even though the average temperature for the day may be above 65°. Frequently on these days the house may be overheated in the morning because the heat stored in the heating system is more than is necessary to make the house comfortable. Then, too, it may be necessary in the fall to keep the house somewhat warmer than during the winter months, since at this period of the year the human body is not acclimated to lower temperatures.

Those who heat with gas really know what their heating costs are for each monthly billing period. Instead of buying their fuel in advance they buy it as they use it and now, with the Degree Day Deficiency data shown on the bill, they have a means of accurately comparing one month with another and one season with another. When such comparisons are made the gas used for cooking, water heating and other uses should be deducted from the total usage before the heating comparison is made. It is also wise to make all comparisons on the basis of the quantity of gas used rather than the cost, as during the months of greater usage more gas will be purchased on the lower steps of the rate.

Zero Degree Days

Some customers may wonder why average monthly temperature data would not give results which are equally as satisfactory as the use of the Degree Day Deficiency unit of measurement. During the months which normally embrace the heating season there are days when the average temperature is considerably above 65°. Such days increase the temperature average, but the surplus heat on these days is of no value in bringing up the temperature on the cold days and should be disregarded in heating calculations. When the Degree Day unit is used average temperatures of 65° or 75° or 85° for any day are recorded as Zero Degree Days.

Another disadvantage in using average temperature data without converting it into Degree Day Deficiency is that it does not give a proper sense of proportion. To the average person a temperature of 45° would seem to be about 25 per cent colder than 60°. However, if each of these temperatures is the average for a day and is reduced to Degree Days, the 45° temperature becomes 20 Degree Days while the 60° temperature becomes 5 Degree Days. The difference is actually 300 per cent.

Plan Proven Valuable

This Degree Day information proved to be highly valuable during the months that followed, for compared with the previous season the weather this last season was unusually severe. October was 76 per cent colder than the preceding year, November was 124 per cent colder and December, 55 per cent colder. Without this Degree Day information it is likely that there would have been much apprehension concerning the cost of heating during these months.

Adding to the possibilities for trouble was the fact that the company had advertised new gas and new rates which were to reduce heating costs one-third. On a Degree Day basis the reduction did materialize, and, because of the information on the bill, most of the customers observed this without even inquiring at the office. Those who did not understand were easily satisfied because the facts were all on the customers' statements and the ground-work for intelligent explanations had already been laid.

In January an article explaining the weather for the current winter and the application of the Degree Day Method of determining heating requirements appeared in the Company magazine under the title "How Cold is Cold?"

Marked copies were sent to all heating customers and the fact that several wrote us suggesting that we send the magazine to all heating customers (each apparently thought we had merely singled him out and mailed him a copy) proved to us that the explanation was well received.

The Degree Day system is the most accurate system that has been devised for determining just how cold a winter really is from the standpoint of measuring fuel requirements. There is every reason for giving our heating customers *complete* information concerning it.

In looking back over the house heating sales program for 1932, the company feels that there is no question but that this simple system of acquainting and keeping customers acquainted with heating requirements, from a Degree Day standpoint, has been its most important sales promotion feature.

Cooperative Advertising Takes New Tack in Missouri

THAT the Missouri Association of Public Utilities is meeting with success in its campaign of advertising in the press of the state for the promotion of better relations between dealers and utilities in the sale of appliances, is evidenced in the change of tone of the advertising copy now being used. The appeal has been changed from the merchandising theme to that of building dealer good-will, following the defeat of the Maxey Fair Merchandising Bill at the recent session of the state legislature.

Another evidence of good results produced by the Association's advertising campaign is the action taken by the Missouri Association of Master Plumbers at its recent convention in Springfield, Mo., in withdrawing from the Fair Merchandising Association of Missouri. The latter group has been active in sponsoring anti-merchandising legislation in the state.

CO-OPERATION
between Dealer and Utility is Necessary for Complete Merchandising Service

Your utility companies have always endeavored to co-operate with every agency selling gas and electric appliances so that the best interests of the public and community might be served.

It is the desire of the utilities that the public support good dealers in the sale of those appliances used in utility service, and the utilities in their merchandising desire to help the dealers in every way possible in the promotion and sale of reliable articles that increase use of gas and electricity.

Mutual understanding is of vital importance. We are striving to co-operate with our fellow merchants to cement relations of permanent friendship. In our dealings with all merchants we endeavor to be fair, helpful and ethical in every way. Any exception to this policy should be brought to the attention of your Utility or this Association.

We invite every open minded merchant to have a frank heart-to-heart talk with his local utility manager and see for himself the many advantages of the high standard of utility merchandising procedure, co-operative advertising, display and sales assistance offered.

Today our nation is emerging from a great economic crisis. Co-operation is needed as never before. The business men of our country and our state, big and little, must stand side by side, and with a spirit of mutual understanding and sympathy, fight to restore public prosperity. We pledge ourselves to go the limit in achieving this end.

MISSOURI ASSOCIATION of PUBLIC UTILITIES

The accompanying illustration is a reproduction of the ninth in a series of advertisements appearing in the press of the state during the past several months. This copy ran during the last week of April and the first week in May.

Menefee Wirgman Named Director of Louisville Gas and Electric Co.

Menefee Wirgman, president of the Fidelity and Columbia Trust Co., Louisville, Ky., has been elected a director of the Louisville Gas and Electric Co., replacing Donald McDonald, Jr.

Special Equipment for Gas Appliance Delivery

DALLAS Gas Co. has a new type appliance delivery truck which has been constructed under the direction of W. F. Pearson, general shop foreman of the company. The device, illustrated above, is made of extra heavy pipe framework, fastened to the bed of the truck, a half-ton geared chain hoist and an I-beam.

Two-inch pipe standards at the four corners of the truck body are flanged and braced; these standards extend about four feet above the floor of the body of the truck. Adjustable trusses, held in position by pins, slide into these standards and may be raised to accommodate equipment or lowered when the truck is housed in the garage.

In case of rain, a tarpaulin is stretched across the slanting beams, protecting the appliances from damage. The design was worked out by Mr. Pearson and the equipment was made at the company shop at Dallas, Texas.

Community Natural's Range Sale A Success With 236 Total

COMMUNITY Natural Gas Co. of Dallas, Texas, reports an interesting range sale campaign in which the quota was moved forward twice, and which finally succeeded in going over the top by reaching a total of 236 ranges sold, or 90 more than the last quota set. The quota for the campaign was first set at 146 ranges, but as sales began to mount, the quota was moved up to 190, one above the company's record in 1932.

According to C. L. Trevitt, new business manager for the company, 129 of the 236 ranges sold replaced electric ranges, 16 replaced other fuel, and the remaining 91 replaced obsolete gas equipment.

Clem S. Nunn Appointed Referee in Louisville Rate Case

Clem S. Nunn has been appointed by District Judge Cochran as referee in a conference to be held between officials of the Louisville Gas and Electric Co., Louisville, Ky., and attorney's for the City of Louisville, the latter asking for a reduction in gas and electric rates.

Franchise at Cheyenne, Okla.

Joe Brickell has applied at Cheyenne, Okla., for permission to construct a gas distribution system and sell gas there.

High B. t. u. Gas Being Served in Des Moines in Lieu of Rate Reduction

Des Moines Gas Co., Des Moines, Iowa, turned the new 800 B.t.u. mixed natural and manufactured gas into its mains on June 21, with 250 appliance adjusters at work. The new gas is composed of 70 per cent natural and 30 per cent manufactured, replacing 530 B.t.u. gas which was 60 per cent natural and 40 per cent manufactured.

Provision for supplying the new gas was made earlier in the year, when an agreement was made between the gas company and the city council regarding rates.

Richmond, Ky., Wants its Gas Plant Improved

Plans and specifications for improvements to the city gas plant at Richmond, Ky., have been prepared and submitted to the Reconstruction Finance Corp. for its approval. The city has applied for a loan of $40,000 with which to complete the work, according to William O'Neill, Mayor of the city of Richmond.

New Louisiana Gas Company

Formation of Coastal Gas Corp. at Shreveport, La., is announced. E. C. Tucker of Tyler, La., is president of the company.

National Directing Committee Program

(Continued from Page 10)

Since that time we have visited 62 gas utility companies in every section of the country.

We find the industry at the crossroads. A tremendous opportunity lies before it. There is a practically immeasurable market for appliances, and therefore for gas, available today. With the exception of a few aggressive companies scattered throughout the country, this market to all intents and purposes is being ineffectively exploited. True, the ordinary motions of merchandising and advertising are universally being made. But there is little coherent effort back of these motions. The proof of this is in the poor results obtained by most companies as compared to the achievements of the ones with successful promotion.

The success of these few companies—who are following, in the main, the recommendations and policies urged by the American Gas Association—is, however, the most encouraging indication of the scope of the opportunity which is open to all.

In the industry generally there is a lack of coordination of effort and procedure. There is even no agreement among the utilities (even those operating under similar conditions) as to the advantages of promoting certain major appliances. We find no generally accepted procedure in such fundamentals as the training of sales forces, the cooperation of all employees, the obtaining of active cooperation of plumbers and other retail outlets, the carrying out of advertising policies or the doing of service work as an aid to sales promotion.

The industry does not need a cure-all or a strikingly new idea for the promotion of its sales. What it does need is to raise the promotional activities to a reasonably higher level as has been done by these aggressive companies. When this is done the industry will begin to capitalize on its possibilities for appliance sales and load building.

The most conservative estimate gives 50 per cent as the proportion of gas ranges in the country which have no improvements whatever. We all know that while these ranges do fill the need of the housewife for cooking, they are neither efficient nor satisfactory to use. It is up to the gas industry to replace these out-of-date appliances with modern and effective ones. If it does not, someone else surely will.

A mere showing of appliances and listing of prices in an advertisement will not create desire and appreciation but merely offers shopping information for those who *must* buy a new range. Surely that is not the way to build a market. Yet it represents, in a general way of speaking, the policy of many utilities.

It seems evident to us that if appliances are to be sold—and through the sale of appliances the gas load increased—a new acceptance and regard must be built for gas as a fuel and for the service it renders as expressed through modern appliances of the finest quality.

But it will not be enough merely to speak convincingly of these modern appliances, to present them attractively locally or nationally through the medium of advertising. They must be sold and the great need of the industry is to marshal the tremendous manpower available into a unified, aggressive and determined unit.

We realize that on numerous previous occasions an effort has been made to mobilize the gas industry into unified action. These efforts have all failed. As we study them it seems to us that the reason for their failure was that the problem was viewed only nationally and that the proposed programs placed all or most of the burden upon the national organization and upon the national advertising. Because or what we have learned regarding the gas industry and because of our experience with national trade associations, our recommendations are radically different. While in detail they differ but little from previous recommendations, they recognize this fundamental fact.

Direct selling always has been and always must be the function of the local units of the association. The association itself must provide a background of educational material and promotion upon which this direct selling can be more effectively carried out, but that is all that should be expected of it.

The recognition of this necessary aggregation of the primary functions of association effort has several advantages.

It permits local conditions to be taken into consideration because local units carry on their own effort.

By retaining the majority of the expenditures in the hands of the local units it makes the burden of money raising far less onerous for the national organization.

With the national effort having the proper character or scope, the whole program becomes far more acceptable to the local units and it is possible, therefore, to secure the active cooperation and participation which is necessary if the effort is to be a success.

Our recommendations, therefore, include the following points:

1. The readjustment of retail and wholesale appliance prices to make possible the conduct of sales promotion activities upon a sound economic basis.

2. The adoption of rates of a "promotional" and "inducement" character based on local conditions.

3. The organization of local effort for the development of local sales along more aggressive and constructive lines in order that the present expenditures shall be applied as to bring to the local company increased returns and to make their efforts definitely a part of the national program.

4. Advertising in national and trade publications such as are at present being successfully used to mold public opinion and regard in favor of competitive fuels and appliances.

Through national advertising the public can be convinced that gas is modern. It will help to lift the quality of the gas appliances sold and will assist in the standardization of prices—which we regard as being of primary importance. It will help protect the present local loads and assure the increase to which the gas industry is entitled.

The pressure of public opinion created through national advertising will provide a force to mold the gas industry into a compact unit and influence the local utilities to put into effect the policies which the National Directing Committee knows must be practiced if the standards of merchandising and promotion are to be raised.

Such advertising will give the gas industry a national identity which it does not have today.

By taking advantage of the recommended activities of the local companies, an adequate campaign of national advertising can be carried on for one year at a cost of approximately $350,000.

We would place this advertising in opinion-forming publications such as the Saturday Evening Post and Time; women's magazines like Good Housekeeping and the Woman's Home Companion; class magazines like Harper's Bazaar, Vogue, and Fortune; home publications such as House Beautiful, House & Garden, Better Homes & Gardens, and Red Book; architectural publications, engineering magazines, and gas trade papers.

Cooking, water heating, refrigeration, home heating—we recommend that each additional advertisement feature seasonably one of these four major uses in terms of its appliance, but carry the others in subordinated degree so as to give a complete story of these services of gas in the home. Every advertisement would illustrate and emphasize the American Gas Association Laboratory Approval Seal.

Through the use of advertising of this type, local conditions in every part of the country would be met since every appliance in each advertisement is promoted and sold in some part of the country.

We also recommend the appropriation of $25,000 with which to release on behalf of the gas industry news articles and publicity stories in the national and trade press to combat the publicity on competitive fuels and appliances which is being so universally distributed at present.

Campaigns of advertising and news publicity such as we are recommending should be a continuous and integral part of the promotion of the gas industry. Certainly they should not be undertaken on a basis of less than three years. At the end of that period, it may be that some of the appliance manufacturers will be in a position to conduct adequate national advertising on their own behalf. But in the meantime, unless the gas industry combines to make use of this powerful weapon, its competitors will continue their present advantage unchallenged.

We cannot impress too forcefully upon the National Directing Committee its responsibility in securing the wholehearted cooperation of the executives of each gas utility of the country in connection with this program. Without their courage, vision, and active help these sales and advertising recommendations cannot succeed."

Mr. Gilman, in addition to the foregoing report, made 14 detailed recommendations for sales promotional efforts and merchandising work of local utilities. These recommendations are too long for presentation in full; however, I give the recommendations by headings:

1. The readjustment of retail and wholesale appliance prices to make possible the conduct of sales promotion activities upon a sound economic basis.

2. Rates of a "promotional" or "inducement" character based on local conditions.

3. Systematic, concentrated training of sales forces to increase efficiency and reduce turnover.

Slide films are recommended for:

(a) The education of salesmen, plumbers and dealers.

(b) The actual closing of sales.

4. Readjustment of compensation to secure more earnest effort from the sales force and to prevent conflict between salesmen's efforts and those of plumbers and other retail outlets.

5. The determination of a planned and systematic sales program covering the entire year.

6. The planning of local advertising to present constructive sales-minded messages of

PAULIST MISSION CLOSES SUNDAY
OLD SAN FRANCISCO
GERMAN DUELING SAFER THAN GOLF
TURN ANY FAUCET
HOT WATER
at any hour... day or night...
AUTOMATIC GAS WATER HEATER
THIS VALUABLE SPACE
beside the P. G. & E. sales story is open in your local newspaper
USE IT
to increase Gas Appliance sales in your store
P·G·and·E·
PACIFIC GAS AND ELECTRIC COMPANY

"WHERE CAN I BUY THIS APPLIANCE?"

It Pays to Answer This Question Asked By Two Million Readers of P. G. and E. Advertisements

Gas Appliance dealers should familiarize themselves with this company's advertising and its profitable application to their businesses. P. G. and E. advertisements are ***promotional*** in character. Their prime purpose is to CREATE DESIRE for the major appliances YOU have to sell.

Above all, we want to develop a real appreciation for what gas can do in the home—at a cost so small that it has become not only the most valuable, but the cheapest servant any housewife can have.

To achieve this goal we are spending thousands of dollars every month in DEMAND-BUILDING publicity. In order that its selling force may be tapped by dealers anywhere in P. G. and E. territory, these advertisements are published in two hundred eighty-nine newspapers.

While our newspaper publicity is consistently backed up by powerful "reminder" advertising on billboards, truck signs, window displays, etc., the real job will always be done in newspapers. It is in this medium that dealers are best able to TIE-IN.

This company wants to see its advertising localized at the point-of-sale, and we try to prepare each advertisement so this can be done at lowest possible cost to the dealer.

P. G. and E. advertisements, dominating the page on which they appear, assure a high percentage of ***readers*** per thousand circulation. Your tie-in advertisement should be published next to the P. G. and E. advertisement to receive strong reader-attention and capitalize fully on our invitation to "See Your Local Dealer."

The exact procedure in publishing TIE-IN ADVERTISING is explained in the P. G. and E. Dealer Bulletin. If you are not already on our mailing list, we will be glad to send you this sales building guide each month. Address P. G. and E., 245 Market Street, San Francisco, Room 428.

PACIFIC GAS AND ELECTRIC COMPANY

P·G·and·E·

Owned · Operated · Managed
by Californians

207-733

interest to the consumers, instead of the average listing of equipment and prices.

7. The development of a personality around the utility and its personnel for use in constructing news articles that will more definitely establish the utility as a servant of the community.

8. The arrangement of meetings with plumbers, department stores, mail order houses, furniture stores, for the organization of merchandising drives; these meetings being planned to put plumbers and dealers to work in the true meaning of the word.

9. The development of a plan, giving plumbers connection work on appliances sold, the distribution of this work on sales by utilities and other outlets, to be according to the plumbers' own sales performances.

10. The organization of merchandising drives. Briefly, these should include:

(a) Dealer meetings.

(b) Specific assignment of responsibilities to everyone present at the meeting.

(c) Special dealer displays.

(d) Special floor displays in department stores, etc.

(e) Special tie-in advertising by plumbers and dealers, etc.

(f). Special direct mail campaign to be undertaken by plumbers and dealers on their own prospects, and material provided by utility.

(g) Special promotion work by home service departments with cooking schools in newspapers, the home economic classes in schools, women's clubs, etc.

(h) Cooperation of home service department with aggressive plumbers and dealers for work on their prospects.

11. The training of the entire personnel of the utility for the promotion of gas and gas appliances.

12. Survey of gas consumed by customers, who have purchased new appliances within the last year, to prove increased load.

13. The setting up of a kitchen styling service to be used not only for individual prospects, but with speculative builders, architects, engineers and building owners in modernization programs, etc.

14. A comprehensive survey by the utility of all gas equipment on its mains, whether in use or not, and of all competitive equipment in the homes of customers; this to be used for the development of constantly better organized sales management and effort.

The recommendation of the National Directing Committee and the report of Ayer & Son have been accepted by the American Gas Association through an appropriate resolution adopted at the June Conference. The committee has now been instructed to proceed with a suitable plan for financing the rather modest requirement of $350,000 for national advertising. The committee feels that, by cooperation between the utilities and the appliance manufacturers, it will have no great difficulty in raising this sum of money. As soon as the necessary financial support for national advertising, which is but one element of the program, has been obtained, the full plan will be announced to the industry.

On behalf of the National Directing Committee, I bespeak the earnest support of the chief executives of all of the gas companies on the Pacific Coast to carry out our completed plan.

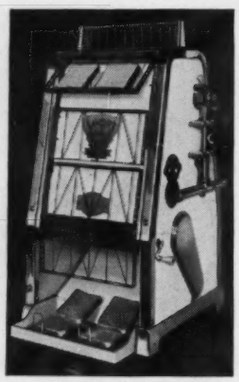
SOUTH CHESTER STEEL PIPE

Excels for Gas Service

The unusual care given to accuracy of diameter and welding qualities, makes Chester Pipe a favorite for gas lines.

SOUTH CHESTER TUBE CO.
Chester, Pa.

Beyond the City Mains



The SAVORY MODEL P D
360 slices of Perfect Toast per Hour—yet the Savory Model PD costs only from ¼¢ to 1¾¢ per hour to run.

Both in city and country the Savory radiant gas Toaster and Broiler are steady-earning money makers. Whether they are run with gas from the mains or with Butane or Propane gases from tanks, you will be able to demonstrate that they are cheaper and more efficient than any electric toaster or broiler made.

The Savory radiant gas Toaster is *really* automatic—and it *doesn't burn toast.*

It is cheap to install, to service and to run.

Write for full particulars and a list of successful users of Savory radiant gas Toasters, addressing Savory, Inc., Dept. WG-7, 591 Ferry Street, Newark, N. J.

SAVORY
radiant gas
TOASTERS

Eliminate COLD 70°

The Low Limit Control System enables your gas burner to deliver full performance by keeping enough heat in radiators and hot air registers to prevent air stratification or "Cold 70°". A low priced control with a ready market. Minneapolis-Honeywell Regulator Company, 401 East 28th Street, Minneapolis, Minn. Branch offices or distributors in all principal cities

MINNEAPOLIS-HONEYWELL
Control Systems

John J. Burns Resigns from Position With Laclede Gas Light

JOHN J. BURNS, for 9 years investment manager for the Laclede Securities Co., St. Louis, Mo., has resigned from that position. Mr. Burns has no plans for the immediate future, but intends to take a vacation before making new business connections.

Mr. Burns is a native St. Louisan and left high school to enter the employ of the old St. Louis Gas Co. which was merged with the Laclede in 1890. He remained with The Laclede Gas Light Co. until February 1, 1932, as head of various departments, serving as commercial manager for the last 25 years.

He has served as a member of the advisory council of the American Gas Association, and for 2 years was chairman of the Commercial Section of the Association.

To Drill for Craig Supply

Rocky Mountain Gas Co., subsidiary of Ohio Oil Co., is planning to drill a second well on the Craig Dome, west of Craig, Colo., for additional supply for the town.

Utility Selling Is Vindicated in Kansas

(Continued from Page 9)

Judge Garver and Robert Stone, Topeka attorney, represented the companies in presenting the evidence to the Shawnee District Court and making the arguments before the supreme court.

The decision will make no change in the merchandising plans of the Gas Service Co. since this company did not abandon its sales department. It is expected, however, that some of the other Kansas utilities will resume merchandising programs and again give to their customers the service they can obtain only from the gas or electric companies.

Reduction in City Gate Rates for Chicago District Companies

The Illinois Commerce Commission has approved a rate reduction in the price paid by gas companies for natural gas purchased from Natural Gas Pipe Line Co. of America by Chicago District Pipe Line Co., at Joliet, Ill. The gas is resold under contract to Peoples Gas Light & Coke Co., Public Service Co. of Northern Illinois, and Western United Gas & Electric Co., all serving in the Chicago district. The price for gas has been reduced from 32 cents per M c.f. to 27.6 cents per M c.f., which for the three companies will amount to about $1,800,000.

Union Gas System, Inc., Takes Over Union Gas Corp.

Transfer of the gas properties and interests of the Union Gas Corp. operating in Southeastern Kansas to the Union Gas System, Inc., has been approved by the Kansas Corporation Commission. The latter company has been newly formed and has been given permission to operate by the commission. Authority to issue securities including $1,343,250 in bonds. $1,722,000 preferred stock and 80,595 shares of no-par common stock, has been given.

Moore Gets Extension on Natural Gas Franchise at Lubbock

John W. Moore Construction Co. has been granted an extension until August 1, 1933, on its franchise to serve natural gas in Lubbock, Texas. Mr. Moore states that he has 4,000 customers signed for the new service, and will have it available by that date.

New Kentucky Gas Company

Kentucky Consolidated Gas Co., Prestonsburg, Ky., has been formed for the purpose of taking over the interests of several small firms in the county, with G. W. Chapman of Huntington, Ky., as superintendent.

Office of Central Power Moved

Central Power Co. has moved its Hastings, Neb., offices to 220 N. Lincoln St., where additional space has been made available.

"MODERNIZE as you repair"

THE SPRAGUE METER COMPANY

BRIDGEPORT, CONN.

Los Angeles, Calif. San Francisco, Calif.

Davenport, Iowa

Newark, Ohio. Houston, Texas.

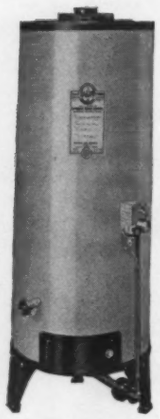
If you would keep in touch with the Natural Gas and Butane industries, send a check for $2.00 to

WESTERN GAS
810 South Spring Street, Los Angeles

Name.....
Company.....
Position Occupied.....
Street Address.....
City and State.....

Subscription Rates: I Year $2.00; 3 years $5.00; Foreign $3.00 per year.

HIGH QUALITY—LOW PRICE



AGP

AUTOMATIC STORAGE GAS WATER HEATERS

Three models of quality water heaters at a price range to meet any campaign requirement. Each combines the highest efficiency with improved principles of design and sturdy construction. Perfectly controlled, highly efficient, yet lowest in price for comparable quality.

A. G. P. made in galvanized or Everdur tanks—20-25-30-40-75 gallon sizes.

A. G. P. SPECIAL made in galvanized tanks—20-25-30-40-75 gallon sizes.

THE DICTATOR Low-Priced Water Heater is made in galvanized or Everdur tanks—15-20-30-40 gallon sizes.

Write for Literature!

AMERICAN GAS PRODUCTS CORPORATION

40 West 40th St., New York, N. Y.

Division of

AMERICAN RADIATOR COMPANY

NO-OX-ID IRON-RUST

The Original Rust Preventive

Pipe Still "New"

After 5 Years

Dearborn Representative, E. M. Mitchum, recently sent in the report below following an inspection:

"We examined pipe line coated about five years ago and wrapped with Brown Wrapper at a point where riser comes out of the ground and up to the understructure of a bridge. The pipe is still in as good condition as the day it was installed."

NO-OX-ID has won its high standing because of rapid and easy application, combined chemical and mechanical protection, extremely long life, high resistance to corrosive agents, surprisingly reasonable cost. Serviced by experienced representatives.

Inquiries invited.

DEARBORN CHEMICAL COMPANY

LOS ANGELES:
807 Mateo Street
Phone TRinity 3385

SAN FRANCISCO
421 Bryant Street
Phone SUtter 8688

1933

A CENTURY OF PROGRESS CHICAGO

S. R. Dresser Manufacturing Co. Purchases Bryant Heater Co.

S. R. DRESSER Manufacturing Co. has acquired the facilities and business of the Bryant Heater and Manufacturing Co. of Cleveland, Ohio. The purchase was consummated on June 15, and operation of both companies is now under Dresser direction. The Dresser board chairman, F. A. Miller, and the Dresser president, H. N. Mallon, have taken on like responsibilities in the Bryant company.

In this acquisition, the company's program of expansion, begun in 1880 with its founding at Bradford, Pa., advances again. Since 1880 more than 100,000 miles of gas transmission lines have been laid which used Dresser couplings. The company has also developed a series of clamps, sleeves and fittings for pipe line maintenance. In 1931 the company organized a water-works division and later formed the Dresser Manufacturing Co., Ltd., in Toronto, Canada. Through its ownership of the Bryant company, the Dresser organization will enter the air-conditioning and house heating field, and announces that new products and improvements in this field are under way, to be announced later by the company.

Natural Service Now Scheduled for Minneapolis in October

Negotiations are reported to be completed between the Northern Gas and Pipe Line Co. and the Minneapolis Gas Light Co., Minneapolis, Minn., for the purchase of natural gas by the latter company from a line to be constructed by Northern Gas and Pipe Line from a point near Owatonna in a northeasterly direction to a town border station approximately south of the division line between Minneapolis and St. Paul. The line will be of 18-inch pipe, and will serve state institutions in Faribault, Minn., following the signing of agreements in June between the state board of control and the Minnesota Northern Natural Gas Co., subsidiary of Northern Gas and Pipe Line Co. The new carrier will cost approximately $2,000,000.

Northern Gas and Pipe Line Co. Holds Sales Meeting; 50 Attend

Fifty officials of the Northern Gas and Pipe Line Co., and the 18 utility companies in its system distributing gas in Nebraska, Kansas, Iowa, South Dakota and Minnesota, met at a sales conference in Omaha, on May 26. Sessions and a luncheon were held at the Fontenelle hotel in that city.

F. H. Brooks, president of the company, stated that sales of natural gas and appliances in the five states are expected to reach a new high in volume this year, with plans under way for the construction of many additional miles of pipe line.

New Natural Gasoline Plant Going in near Pampa, Texas

Magnolia Petroleum Co., is constructing a 25,000-gallon natural gasoline plant in Gray County, Texas, three miles from Pampa to be designated as the Kings Mill plant. Gas will be supplied from several of the Magnolia company's wells.

"Modern Gas Appliance Week" Staged by Dallas Gas Co.

"Modern Gas Appliance Week", from May 24 to May 31 was observed in Dallas, Texas, marking one of the first dealer-cooperative sales efforts to be sponsored by Dallas Gas Co. The central theme of the campaign was built around the idea of modernizing the gas equipment in the home before prices rise.

The campaign was backed up by a strong advertising program—35,000 broadsides being sent out in advance by the gas company, and following the direct mail blast, newspapers carried large space advertising copy. Dealers were given banners for their windows, and gas company trucks and cars carried signs of black with letters in white bearing the words "The All-Gas Kitchen is cool, colorful, efficient—it's more modern."

A similar plan was carried out in the Texas Cities Gas Co. system in Galveston, El Paso, Waco, Paris, Wichita Falls and Abilene, and by the Fort Worth division of the Lone Star Gas Co.

Personnel Changes for United in Louisiana District Offices

Several changes in personnel have been made in the United Gas Public Service Co. system in Louisiana during the past few weeks. L. C. Thompson, manager for the company at Bunkie, La., with seven towns under his direction, has been transferred to take charge of sales at Jacksonville, Texas.

F. H. Boekelmann has been named manager at Bunkie, to take the post left vacant by Mr. Thompson. Roland Chachere has been transferred from the company's office at Oakdale to take charge of service in Bunkie.

Philip Militello has been transferred from the Lake Charles office of the company to act as service manager at Oakdale, and will be in charge of service in Oberlin, Kinder and Elton, replacing Mr. Chachere.

L. H. Pasche has been transferred from Bunkie to Lake Charles, La.

Christy Payne Named Vice-President, Standard Oil of New Jersey

At the annual meeting of the board of Directors of the Standard Oil Co. of New Jersey, held early in June, Christy Payne was elected vice-president of the company. Mr. Payne has been a member of the board since 1927, and is president or a director of several natural gas operating companies which Standard of New Jersey either owns or in which it has an interest. Mr. Payne has served for some time as director of the natural gas interests of the company.

Montana Public Service Commission Holds Billings Gas Co. Rates Fair

The Public Service Commission of Montana in May handed down a decision giving the Billings Gas Co., Billings, Mont., a clean bill of health in regard to its gas rates, holding that the present rates charged by the company are reasonable and just. The utility voluntarily submitted appraisals of its properties at the hearing.

Law Regulates Connections and Outlets for Gas Stoves

A law was passed at the last session of the Kansas legislature which provides that all gas stoves in any public building, resort, hotel, restaurant, tourist camp and other similar place in the state of Kansas shall be equipped with metal connections and shall be properly connected with a chimney or other outlet or combination of outlets.

Owners of buildings of the types mentioned having gas equipment are given 90 days in which to equip and connect them, and stoves installed hereafter must be so equipped and connected at the time of their installation.

N. H. Mull to Head California Natural Gasoline Association

California Natural Gasoline Association, at its recent election, named N. H. Mull, superintendent of natural gasoline operations for the Texas Co. of California, as its seventh president. Herbert Eggleston, manager of the gas and refining department of the Gilmore Oil Co. has been elected vice-president. The retiring president, Ray Wheeler, manager of the gas department General Petroleum Corp., was recently elected a vice-president of the Natural Gasoline Association of America, Tulsa, Okla.

American Colleges Invest $95,000,000 in Utilities Bonds

A recent survey of 30 American colleges and universities revealed that they own $95,000,000 in public utility bonds and $87,000,000 in railroad bonds, as compared with $44,000,000 in industrial and $17,000,000 in United States Government issues.

New Project for 200-Mile Line from Montana to Regina

J. C. Boyle, representing a British-American Syndicate is negotiating for leases in the Bowdoin gas field in Montana, with the purpose of obtaining an adequate supply of gas for a proposed 200-mile transmission line from that field to Regina and Moosejaw, Saskatchewan.

R. A. Stephen Transferred to Plainview

R. W. Lewis has been named to take charge of the West Texas Gas Co. office at Tulia, Texas, following the transfer of R. A. Stephen to the company's office at Plainview.

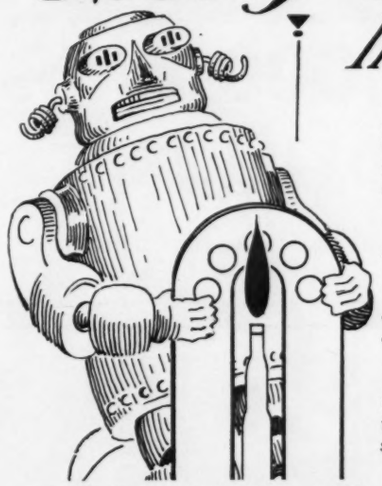
Stillwater Franchise Extended

Franchise of the Northern States Power Co. for the service of gas in Stillwater, Minn., has been extended for the period of a year.

Schools to Be Heated With Natural

Schools at Red Cloud, Neb., will be heated with natural gas this coming winter, a contract having been signed for delivering the new fuel by Natural Gas Distributing Co.

Test PowerStat
In Your own Plant



"POWERSTAT sounds interesting," one manufacturer wrote. We, like others, have been trying to solve the pilot situation on gas appliance without success. Would you ship one on trial?"

Sure! We do it every day, so confident are we that *POWERSTAT* will sell itself.

Results of tests are coming in daily, everyone satisfactory, confirming what our experience has already proven.

POWERSTAT Pilot Control is revolutionary—every gas utility and appliance man should know about it. Trial order shipped without obligation. Write today.

POWERSTAT CORPORATION
• 557 Market St. • San Francisco

Automatic Pilot Control

PowerStat

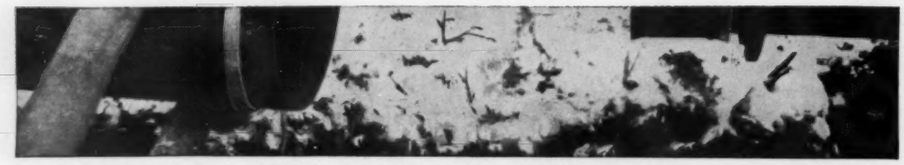
PAPICO
ODORIZERS
for Natural Gas Systems
Write for Engineering Data
HARRY F. HALDEMAN, INC.
ENGINEERED PRODUCTS
411 West Fifth St. Los Angeles, Calif.

The Goodman Stopper
The Reliable Shut-off for Street Mains

Equipped with Improved Patented Locking Sleeve, which locks both handles to the pipe. Stopper cannot slip. Gas cannot pass.

Safety Gas Main Stopper Co.
523 Atlantic Avenue, Brooklyn, N. Y.

Pac. Coast Rep.: C. B. Babcock Co.
135 Bluxome Street
San Francisco, California



Over 10,000,000 In Use

It's safest to specify Paranite
The leading Pipe Joint Gasket
Sold by Pipe Joint makers

TRADE PARANITE MARK

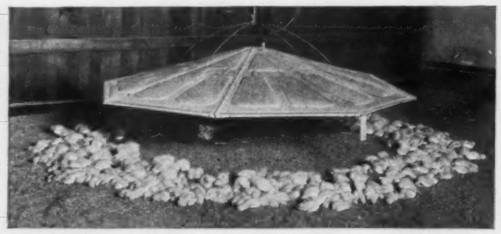
The Manhattan Rubber Mfg. Division
OF RAYBESTOS-MANHATTAN, INC.

Executive Offices and Factories
Passaic, New Jersey

GAS BROODERS

The new type Hart Radiant Gas Brooders are causing a sensation amongst poultrymen. They are proving by far the best means of brooding chicks. Increase your sales of gas by handling this leading line. Hart Gas Brooders will raise a greater percentage of chicks with less labor and expense than any other method. All brooders thermostatically controlled—hang from ceiling—teach chicks to perch—gas pipe runs overhead with flexible gas tubing running to brooder. Get your share of the vast potential fuel load for brooding of chicks and turkeys. One poultryman is worth a dozen ordinary household gas consumers.

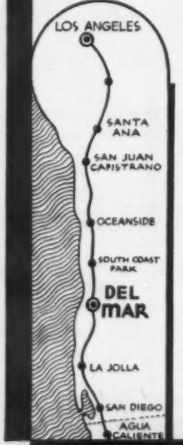
Send at once for descriptive literature, discounts, etc.



Flashlight photograph of chicks sleeping under a Hart Gas Brooder at the world's largest poultry ranch where Hart Brooders are used exclusively. One hundred and forty-four brooders in operation the year round brooding five hundred to one thousand chicks to the brooder.

H. W. HART MFG. CO., P. O. Box 404 W, Santa Monica, Calif.
More Hart Gas Brooders are being sold on the Pacific Coast than any other make.

hotel **DEL MAR** *and English Cottages*



A MAGNIFICENT English-type structure, situated in its own twelve acre tropical garden—overlooking the Pacific Ocean.

Every modern convenience and sports program offered for your pleasure.

TENNIS · GOLF · FISHING
RIDING · DANCING

American Plan
from $5.00 per day

Los Angeles office - call Trinity 3161
IRVING G. DAY, Manager

THREE HOURS SOUTH OF LOS ANGELES

DEL MAR SOUTHERN CALIFORNIA

Lakota Oil and Gas Co. Waiting Casper Council's Decision

Lakota Oil and Gas Co., Minneapolis, Minn., plans to supply Casper, Wyo., from the Alkali Butte and Muskrat fields in eastern Fremont County, Wyoming, with gas from the Texas Co.'s wells there, if Lakota's proposition for supplying the town with natural gas service is accepted by the city council at Casper. If constructed, the line would be between 70 and 80 miles long.

Casper is now supplied with natural gas by the New York Oil Co.

Law Makes Tapping Gas and Oil Lines a Felony

It is now a felony in Texas to tap oil or gas lines, conduits or storage tanks and steal the contents, according to a law recently passed by the state legislature in its recent session.

The same legislature passed a law permitting sour gas to be used for purposes other than light and fuel and also a percentage of sweet gas which has no market outlet.

Booklet on Metallizing Available for Distribution

The Metallizing Co. of America, Inc., Los Angeles, Calif., has prepared a 20-page booklet covering the metallizing process, its applications and accessory equipment. This is the first booklet published which is designed to cover the process fully. The applications cover each field, listing objects coated, type of metal used, and purpose of coating. The booklet has about 50 illustrations showing different types of metallizing work.

Safety Congress to Be Held in Chicago

The 22nd Annual Safety Congress will be held this year in Chicago during the Century of Progress Exposition. The dates are October 2 to 6 and the place is the Stevens Hotel. More than 100 separate sessions are planned for the five-day meeting, and about 5,000 delegates are expected to attend. The prevention of industrial and traffic accidents will be stressed.

Equitable Gas Co. Formed to Take Over Three Utilities

The Equitable Gas Co. has been incorporated at Okmulgee, Okla., with Earl G. Colton as president, for the purpose of taking over the Sapulpa Gas Co., of Sapulpa, the Muskogee Natural Gas Co. and Southwestern Natural Gas Co., both of Tulsa. The new company is authorized to transport and distribute manufactured and natural gas.

Southwestern L. & P. Moving Headquarters to Chickasha

Southwestern Light and Power Co. is getting ready to move headquarters to Chickasha, Okla., from Oklahoma City. Employees in the general office in the latter city will be moved to Chickasha on completion of renovation of the company's building there.

Gas Service During "A Century of Progress"

(Continued from Page 11)

medium pressure main at 23rd St., 1,500 feet of 12-inch main bringing the supply in to where it is connected with 5,300 feet of 10-inch main. Branching off at this point are 1,250 feet of 6-inch, 14,600 feet of 4-inch, 2,000 feet of 3-inch and 1,500 feet of 2-inch main. The entire line is standard coated steel pipe, Dresser coupled throughout, and an additional 3,000 feet of old 12-inch main was leak clamped and hooked up to the new line.

Principal exhibits of the industry are located in the Home and Industrial Arts Group of the exposition. This group includes Gas Industry Hall, Home Planning Hall, and General Exhibits Building.

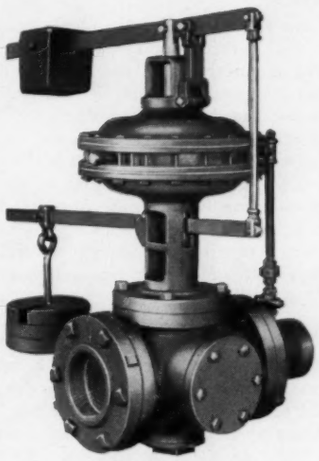
The exhibit in Gas Industry Hall was planned and executed by an American Gas Association committee consisting of R. B. Harper, and B. J. Mullaney, both of the Peoples Gas Light and Coke Co. of Chicago; J. D. Creveling, of H. L. Doherty & Co., New York; F. J. Rutledge, The United Gas Improvement Co., Philadelphia; C. J. Ramsburg, The Koppers Co., Pittsburgh; N. T. Sellman, Consolidated Gas Co. of New York, and Arthur Hewitt, president of the American Gas Association. Mr. Harper is chairman of the committee.

The Hall itself is a building 110 feet long, 100 feet wide and about 30 feet high in its central section. In this building are housed several manufacturers exhibits, large scale models of scenes relating to natural and manufactured gas, large murals symbolic of development in the industry during the past century, and a succession of three sets of dioramas, or three-dimensional pictures in perspective, illustrating historical and modern scenes in gas utilization. In this same group, the Home and Industrial Arts Group, are nine model houses, featuring the use of gas for all heating and cooling purposes. Six of these models show the latest developments in gas ranges, five of them show modern air-conditioning apparatus, and the model Masonite home is entirely gas-equipped, with gas for cooking, refrigeration, laundry, and air-conditioning.

Proof of the splendid character of modern gas service will be apparent in the facilities for feeding an estimated daily attendance of 200,000 persons. Restaurants, sandwich shops, hot-dog stands, coffee and doughnut dispensers, rotisseries, etc., all are using gas fuel in the preparation of food for the visitors. Typical of the restaurants feeding the crowds of visitors are: Old Heidelberg Inn, which seats 4,000 people, feeding 10,000 per day; Blue Ribbon restaurant, seating 1,500 and feeding 17,500 daily; the Ann Rutledge Tavern, replica of Lincoln's time; the Hofbrau, and the Old Vienna restaurant. These and many others are utilizing gas fuel for their cooking, water-heating and other purposes.

Scores of sandwich stands dot the landscape, gas service in every one of them, a feature being 80 automatic gas fired water heaters in these.

For Sensitive Regulation of MEDIUM PRESSURES



THE growing demand for sensitive regulation of medium gas pressures is met in a new addition to the C-F line of regulators. Patterned after the well known Fulton Duplex Low Pressure Regulator, it employs a compound leverage with facilities for delicate weight distribution. The result is great sensitiveness and positiveness of action. This new regulator is adapted for inlet pressures of 50 to 100 pounds and outlet pressures of 5 to 10 pounds. It may be equipped with "V-port" valves for operation under light loads and will still allow full passage of gas at peak loads. Full description on request.

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The Chaplin-Fulton Manufacturing Company

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Parsons Engineering Co.: Los Angeles-San Francisco

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Introducing Radiant Front Circulating Heater

A new and complete line of Fraser Radiant Front Circulating Heaters. The most outstanding circulator on the market today.

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You Can Clean Any Pipe
THOROUGHLY • ECONOMICALLY
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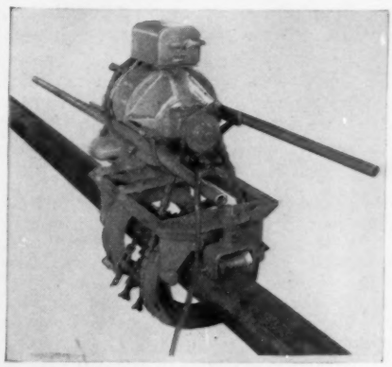
ADAMS ROTARY PIPE CLEANING MACHINE



No other method will clean pipe as thoroughly or as economically as this electric motor driven machine ● Either old or new pipe, above the ground or in the trench ● Without disturbing service.

Phone or Write for Details

Adams Mfg. & Engineering Co.
2068 Belgrave Ave. Kimball 3902
Huntington Park, California

One of the large packing house firms is operating 15 sandwich stands, dispensing potato chips and tomato juice, and using gas under its hot dog cookers.

Gas is also being used for baking, water heating, space heating and incineration for the buildings of the Exposition Administration.

The following exhibits in Gas Industry Hall were designed to give the average visitor to the Fair a good picture of the gas industry at work:

1. Mural depicting the part that science, research, experiment and invention have played in the development of the gas industry. A figure representing the gas industry is mounting the steps of progress marked by Science, Achievement and Invention.

2. Three sets of dioramas, or pictures in perspective, the first showing an old furnace in the basement of a home, with its accompanying dirt and disorder, as contrasted with a new gas fired furnace with a playroom and den in the background; the second showing an old-fashioned kitchen contrasted with one equipped with the latest in gas fired appliances, and the third, showing a street in the old village with its blacksmith shop and forge as contrasted with modern factory buildings with gas fired boilers, furnaces and forge.

3. Model, approximately 100 lineal feet in length, showing the production, distribution and utilization of natural and manufactured gas.

4. A projection screen on which scenes of the industry are thrown continuously.

5. Large-scale model of a landscape on which are modeled the equipment and operations involved in the production and distribution of natural gas through long inter-state pipe lines to metropolitan centers. Above this is a mural in which are given allegorically steps in the development of the natural gas industry.

6. Large-scale model of a gas plant, including all of the operations and equipment necessary in the manufacture of gas. Above this the subject is treated allegorically in a mural, similar to the one described above.

7. The central figure located in the background between the last two murals and their accompanying models, is a gas flame of heroic size, spread before which is the ideal smokeless city in model form. In this panorama gas is being distributed through a visible distribution system for every conceivable purpose.

8. Manufacturers' exhibits which give a general picture of the advancement of the industry during the past century in keeping appliances and equipment up to date during the period of rapid expansion of gas service.

Gas has played a leading role in several World's Fairs of the past century. At the Philadelphia Centennial in 1876 a demonstration took place of cake baking in the oven of a gas range. In 1893, during the Chicago Columbian Exposition, a demonstration of gas as power for street railways was held, and in 1915 in San Francisco, Calif., at the Pan-American Exposition, gas for cooking and water heating was demonstrated as the last word in home keeping advantages. The present Fair, in addition to demonstrating the advance of gas in its long-established domestic uses, is laying emphasis on gas for air conditioning, refrigeration and for many other industrial and home applications hitherto regarded as impractical.

Industry's Manufacturers Organizing

(Continued from Page 7)

Smith, A. Stockstrom (1 year). Mabon Roper is chairman, Stanley Grady vice-chairman; the executive committee of the governing committee consists of Messrs. Roper, Grady, Hoenigmann.

The Institute's code of fair competition, already adopted by present members and to be submitted for additional final adoption at a general meeting on July 18, provides among other items, that:

No prices be quoted less than the full cost of production and distribution—information relative to price bases to be submitted to a confidential agency which will determine whether proper costs are included.

Information on prices quoted by members shall be furnished to any member of the Institute upon request.

Members shall maintain records showing production costs, furnishing same to confidential agency, to be assembled and released as totals only.

Violations to code consist of:

Maintaining conditions of employment less favorable than those of other manufacturers in community where industry is located; selling under cost of production and distribution; selling or offering to sell any article under terms other than those published to the industry.

The governing committee will issue rules to make the code effective, these to constitute a part of the code. They will concern:

Minimum base price; price differentials; standards of products; credit terms; production in relation to demand for products; warehouse stocks; consigned stocks; advertising allowances; variations from standard specifications; close-outs; such other matters as may be necessary.

The code will be submitted to the president when approved by two-thirds of the members of the Institute, and will be in effect 10 days after presidential approval.

A cost and sales price questionnaire has been issued to all gas range manufacturers. This is a percentage questionnaire which is designed to reveal the relationship of shop costs to sales price. Opinions of manufacturers are being sought on amounts which should be added to cover administrative and selling expenses, and as to minimum prices.

A labor questionnaire is also being circulated, and recommendations sought on minimum wages, maximum hours.

In these questionnaires comparisons are sought between current operations and the year 1926.

The above information is offered in some detail to convey an idea of the intensive organization work which is called for under these cooperative agreements.

Progress on Pacific Coast

Similar work has been under way on the Pacific Coast since June 14, when the executive committee of the P. C. G. A. Manufacturers' Section met and approved a set of by-laws for the Section; and the water heater manufacturers completed a code of fair competition which was ratified at a later series of meetings, beginning June 26. R. L. Hinckley of the General Water Heater Corp. is chairman of the P. C. G. A. Manufacturers' Section. R. C. Hoyt of Hoyt Heater Corp. is chairman of the Water Heater Division, and R. E. James of Reem Mfg. Co. served as chairman of the division's code committee.

While there is good reason to feel confident that territorial codes will be recognized when they are brought in under the Act, the Pacific Coast attitude has been to work for an integrated national gas appliance industry under the A. G. A. Manufacturers' Section, with due provision for representation of sectional organizations in preparation of national codes.

Other P. C. G. A. Manufacturers' Section divisions, particularly the furnace group, are advancing their own programs for adoption of fair competition agreements. The water heater organization represents virtually 100 per cent of Coast manufacturers and distributors. The Pacific Coast Gas Association has offered is services to the end of effecting similar agreements among the other appliance divisions through its Manufacturers' Section, and the furnace group, under the chairmanship of ElRoy Payne of Payne Furnace & Supply Co., is already in motion. A meeting of the furnace group is called for July 10 in Los Angeles.

It is encouraging to note how rapidly the manufacturers are taking advantage of this opportunity to remove competitive obstacles. Better conditions should be quick to follow in every appliance group. Psychologically the whole industry is toned up by the assurance that effective cooperation is in sight. Other industries are feeling the same stimulus, and gas sales in industrial classifications are already showing renewed life.

This Month's Cover

is a reproduction of the American Gas Association's official sticker, summoning the industry to "A Century of Progress International Exposition" which opened May 27 and is now in full progress at Chicago. The gas industry's participation in the exhibits was officially signalized by President Arthur Hewitt, in dedicatory exercises on June 3, as related elsewhere in this issue.

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GENERAL MAGNETIC GAS VALVE FEATURES: Electric Hum Eliminated, ½-3" sizes. Low and High Voltage. Built for High Pressure Gas. Made in slow-opening types. Simple in Design—Infallible in Operation—Low in Price.
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SHEER 31-A MOTOR GAS VALVE
Now Entering Its Third Year
LEADS IN PERFORMANCE AND LOW PRICES
Also Hi-Lo Gas Valve, Step-Opening Gas Valve, Thermostats, Safety Pilots, Limit Controls, Space Heater Regulators, Humidifiers, Etc. . . . .
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GAS PIPE LINE MAP

Compiled by the Editors of WESTERN GAS—Size 45" x 45"

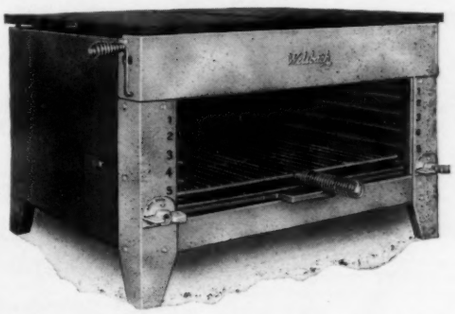
The most comprehensive published; covers the 22 western states in detail. Gives gas fields, names of natural gas communities; sizes of pipe lines and names of pipe line companies.

Prices: $1.50, Heavy Bond Paper; $3.50, Printed on Cloth

WESTERN GAS
810 South Spring St. Los Angeles, Calif.

BROIL
By Means of
INFRA RED RAYS

NEW WELSBACH BROILER-GRIDDLE



Broils, Roasts and Does Griddle Work In
——Half the Time at
——Half the Cost
All this is made possible
by
The New WELSBACH Infra-Ray BURNER

Let us send you full description

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The reason for the long life and low maintenance cost of cast iron pipe is its effective resistance to rust. Cast iron is the one ferrous metal for water and gas mains, and for sewer construction, that will not disintegrate from rust. This characteristic makes cast iron pipe the most practicable for underground mains since rust will not destroy it.

For further information, write to The Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer, 309 Peoples Gas Bldg., Chicago, Ill.

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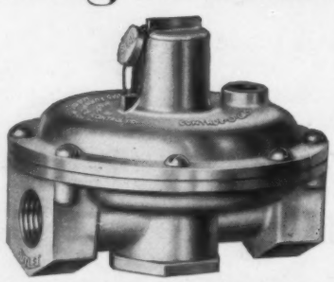
CONTROL-O-GAS
Low Pressure
Regulator



Simple in Construction
Efficient in Operation
Economical
Assures Constant Heat

THE Control-O-Gas Low Pressure Regulator is a *New* governing device developed to meet the demands for safety, economy and efficiency in all gas burning appliances.

Exclusive Distributors

Payne Furnace & Supply Co.
Since 1914
Beverly Hills, Calif.

Revised Syllabus of Columbia Home Study Course Now Available

The Committee on Education of Gas Company Employees of the American Gas Association announces that "Part One" of the revised syllabus in the Columbia University Home Study course on Manufactured Gas is now available. This is based upon the revised edition of Professor J. J. Morgan's book "American Gas Practice, Volume One, The Production of Manufactured Gas." It is expected that the "Part Two" of the revised syllabus, based on Volume Two of Professor Morgan's book and dealing with the distribution and utilization of city gas, will be ready near the end of the present year.

Special information regarding the course may be obtained from Kurwin R. Boyes, secretary of the American Gas Association, 420 Lexington Avenue, New York City.

Ask Industrial Franchise at Tulsa, Okla.; Committee Appointed

Robert Galbreth, Tulsa, Okla., has applied for a franchise to serve natural gas for industrial uses in Tulsa. Mayor Newblock has appointed a committee to investigate the proposition, including J. W. Sloan, president of the Oklahoma Iron Works, R. S. Dodd, retail oil and gas operator, and Peter Admanson, coal mine operator and commissioners Pratt, Bowles and Moody. A public election is expected to be called.

Book On Association Advertising Off the Press

"Some Fundamentals of Association Advertising Procedure" by F. J. Ross, has just been brought from the press by Fuller & Smith & Ross, Inc., advertising and merchandising counsels of New York, Cleveland and San Francisco. The book answers 29 basic questions applying to cooperative advertising campaign preparation and procedure, and sells for $1.50 per copy.

To Survey the Clinton, Mo., Gas, Water and Light Systems

C. A. Haskins, consulting engineer of Kansas City, Mo., has been employed by the city of Clinton, Mo., for the purpose of surveying the gas, water and sewer systems and making recommendations for improvements, reduction of operating costs, and estimates on the cost of building a new system.

Bill Proposes Bonus for Gas Wells

A bill was introduced in the Washington legislature at its last session which proposed a bonus to be paid for the bringing of a natural gas well producing 5,000,000 or more cubic feet daily for 10 days. The proposed bonus is $10,000.

To Serve Natural in Hickman Mills

Central States Gas Utilities Co., Kansas City, Mo., has been granted a permit to construct and operate a natural gas distribution system in Hickman Hills, Mo.

Classified Advertising

Classified advertising five cents per word; minimum $2.00 per insertion. Situation Wanted advertisements up to 50 words will be published three consecutive issues without charge. Small professional cards 1-in. deep by 21 ems wide are $6.00 monthly on 12-time contract.

Wanted: to purchase interest in natural gas acreage with large open flow and good market possibilities. Can handle construction, financing and operation at minimum cost, or interested purchasing propane bottled gas company. Seeking connection with future. Can furnish bank and business references. Address Box E-234 *Western Gas,* 810 South Spring Street, Los Angeles, Calif.

SITUATIONS WANTED—MALE

Meter repairman with four years experience in meter repairing, both tin and iron case, large and small capacity meters, desires permanent connection with reliable company. References. Address Box E-233, *Western Gas,* 810 South Spring Street, Los Angeles, Calif.

HELP WANTED

Wanted: Experienced furnace salesmen for Los Angeles and other cities. Box E-236 *Western Gas,* 810 South Spring St., Los Angeles, Calif.

Change in Utilities Commission Organization in Three States

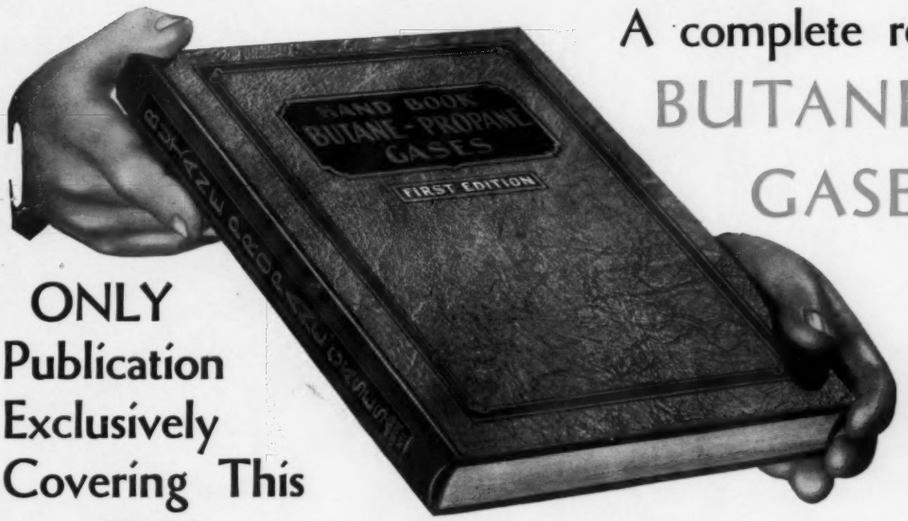
During the past few months there has been a change in the public utilities commissions organizations in several states, among them Kansas, Indiana, and Arkansas.

In Kansas, the legislature passed a bill abolishing the Kansas Public Service Commission and establishing the Kansas Corporation Commission which will take over the duties of the former.

The Indiana legislature enacted a bill which created a new commission of three members to replace the former one of five members, effective immediately.

The Arkansas legislature passed a bill abolishing the Railroad Commission of that state as well as the tax commission and the office of commissioner of conservation and inspection. Most of the powers and duties of the three boards are now vested in the newly created Corporation Commission which is appointive, members being named by the governor.

YOUR COPY-NOW READY



A complete reference work on BUTANE-PROPANE GASES—280 pages fully illustrated

ONLY Publication Exclusively Covering This Field

THIS Handbook comes in response to a very definite need. A tremendous amount of development work has been accomplished for the liquefied petroleum gas industry in a brief space of time, with many companies participating. And to date there has been no one source to which the industry could go for information on all phases of the field. This is the mission of the *Handbook of Butane-Propane Gases*—consolidating and organizing all of these reference data under one cover.

The editors have established close contact with all branches of the liquefied gas industry—production, bottled gas and town plant distribution, gas enrichment—and to assure a high standard of technical excellence for the Handbook leading figures in the industry have extended their cooperation as contributors.

In the next column contents of the *Handbook of Butane-Propane Gases* are reviewed. No phase of the field is neglected, and every major subject heading is treated in detail, making the Handbook an outstanding reference work. Numerous tables, charts and illustrations add to its value.

Orders for the Handbook have poured in from all sections of the United States, and from several foreign countries, since the first announcement of its compilation—indicating again the need for this publication and the growing interest in butane-propane service. A limited printing makes it imperative that you order now. Use the coupon below.

CONTENTS

A CHRONOLOGY OF LIQUID GAS DEVELOPMENT: Beginnings with Blaugas; first liquid natural gas sets; early industrial uses; expansion in domestic marketing; history of equipment; butane plant designs of early days. **PHYSICAL PROPERTIES OF THE LIQUEFIED PETROLEUM GASES:** Table of constants; discussion of general characteristics; vapor pressures; viscosity; specific gravities; combustion data; dew points of the pure gases carburetted with air; mean specific heats. **PROPERTIES OF BUTANE-PROPANE MIXTURES AND RELATION OF PROPERTIES TO TEMPERATURES:** Calculation of properties; calculation of vapor pressures; evaporation of mixtures; calculation of relative quantities evaporated; dew points of mixtures. **COMPOSITION AND ANALYTICAL DETERMINATION OF LIQUEFIED PETROLEUM GASES:** Specifications for commercial grades of propane and butanes; conventional gas analytical tests; low temperature fractionation analysis; description and operation of apparatus; calculations for liquid analysis; automatic operation; interpretation and computation on basis of low temperature fractionation analysis results. **THE MANUFACTURE OF LIQUEFIED PETROLEUM GAS:** Methods and processes in the natural gasoline industry; plant flow scheme for liquefied petroleum gas production; single column rectification; double column rectification with a finished gasoline from the primary unit; double column rectification with finished gasoline from secondary column; weathering; blending; handling from storage. **TRANSPORTATION OF LIQUEFIED PETROLEUM GASES:** Physical properties; grades of product; I.C.C. regulations; Reid method for vapor pressure determination; shipping in cylinders; tank car shipments; transportation by motor truck; pipe lines for butane; water transportation. **THE USE OF BUTANE AND PROPANE WITH MANUFACTURED GAS:** Calculations; enrichment of manufactured gas transmitted under high pressure; use of propane to meet peak loads; use of butane or propane as a substitute for gas oil for the carburetion of carburetted water gas; use of propane or butane for heating gas underfired coke ovens to reduce coke production. **CENTRAL PLANTS FOR BUTANE-AIR SERVICE:** The butane-air process; liquid storage; vaporization; carburetion; control; dehydration; odorization; gas storage; distribution; burner adjustment; conversion plants; representative flow sheets. **CENTRAL PLANTS FOR UNDILUTED BUTANE-PROPANE VAPOR SERVICE:** Field of usefulness of the undiluted vapor system; specifications for a suitable liquefied gas; estimating size and characteristics of the central plant load; design of gas plant; design of distribution system. **LIQUEFIED PETROLEUM GASES AS INDUSTRIAL FUELS:** Unloading and storage system; vaporizing system; mixing system; plant distribution system; atmospheric burners; low pressure combustion systems; diffusion combustion; typical applications; conversion problems, gas-fired equipment; conversion problems, liquid and solid fuel-fired equipment. **APPLIANCE UTILIZATION OF LIQUEFIED PETROLEUM GASES:** Combustion of propane, butane and commercial mixtures of these gases; burner orifice capacities; capacity of service pipe and house piping; general requirements for burners of all domestic appliances; gas ranges; space heaters; water heaters; lighting fixtures; draft diverters; cost of commercial propane compared with natural gas, manufactured gas and electricity. **BOTTLED GAS DISTRIBUTION OF LIQUEFIED PETROLEUM GASES:** The bottled gas field, present and future; equipment for bottled gas service; units engaged in distribution; economics of two-drum distribution; one-drum distribution; customer contracts; lease of equipment; selling through agents; sale by local agent; essentials in permanent market building; National Bottled Gas Association's tentative code of marketing practices; Underwriters' regulations relating to equipment and installations. **MISCELLANEOUS:** Table of flow of gas at low pressure through pipe lines; National Fire Protection Association's regulations pertaining to liquefied petroleum gas systems, other than those using portable containers. **CATALOGUE SECTION:** Detailed information on products designed for butane-propane service. **BUYERS' GUIDE:** A commodity listing of firms supplying equipment, appliances or services for the liquefied petroleum gas industry. **DIRECTORY OF CENTRAL PLANTS; BIBLIOGRAPHY; INDEX.**

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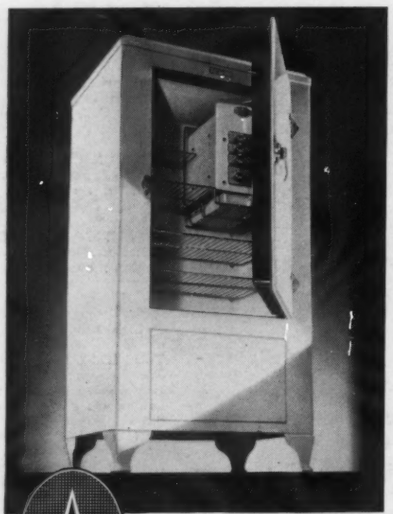
NEW
Bottled Gas Load
EQUAL TO THE COOKING LOAD!

Every* New Air-Cooled Electrolux *you install practically doubles your customer's present bottled gas requirements

TODAY, the one thing most families want—and many are buying in spite of curtailed budgets—is an automatic refrigerator. You can cash in on this popular trend . . . greatly increase your bottled gas sale as well . . . by getting behind the New Air-Cooled Electrolux, the nationally known gas refrigerator.

Record-breaking Public Acceptance

Great as was the popularity of the original Electrolux, that of the New Air-Cooled Electrolux is even *greater!* You'll find the New Electrolux easier than ever to sell . . . From coast to coast, the New Electrolux has caught



on like wildfire. Sales record after sales record has been shattered. Even in places where Electrolux had never before been handled, sales have totaled as many as 500 refrigerators for the first 60 days! And the reason for this tremendous public acceptance is not hard to find! The New Electrolux gives your customers everything they expect of an automatic refrigerator and then gives them more. Even water-cooling of the refrigerant has been replaced by air-cooling to make the New Electrolux finer and simpler than ever!

Write for Complete Details

Right now, plan to make Electrolux a vital part of your appliance merchandising and sales program for the remainder of the year. A standard household model Electrolux consumes approximately the same amount of gas as the cooking range. And every Electrolux you install helps to keep your customer "sold" on the modern convenience and economy of an all-gas kitchen! Get in touch with us at once for full information! Electrolux Refrigerator Sales, Inc., Evansville, Indiana.

NEW *Air-Cooled* **ELECTROLUX**

A PRODUCT OF SERVEL

THE *Gas* REFRIGERATOR

ELECTROLUX REFRIGERATOR SALES, Inc.
Evansville, Ind. (Bottled Gas Div.)

Please send me full details and information of the New Air-Cooled Electrolux and the Electrolux franchise.

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